SELECTED

SESOURCESRESOURCES ABSTRACTS



VOLUME 7, NUMBER 3 FEBRUARY 1, 1974 SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Department of the Interior



VOLUME 7, NUMBER 3 FEBRUARY 1, 1974

W74-01101 -- W74-01650

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the Water Resources Thesaurus. Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCU-MENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established disciplineoriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center Office of Water Resources Research U.S. Department of the Interior Washington, D. C. 20240

CONTENTS

OREWORD	ii
VII - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER

Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE

Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION

Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL

Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION

Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING

Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA

Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS

Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES

Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION

Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

ACID-BASE THERMODYNAMICS OF THERMODYNAMICS OF ACID-BASE
EQUILIBRIA. II. IONIZATION OF M-AND P-HYDROXYBENZOTRIFLUORIDE AND THE
CONCEPT OF FLUORINE DOUBLE BOND-NO
BOND RESONANCE,
Georgia Inst. of Tech., Atlanta. School of Chemis-

For primary bibliographic entry see Field 02K. W74-01226

02. WATER CYCLE

2A. General

A DETERMINISTIC PARAMETRIC WATER-BALANCE MODEL,
Norwegian Water Resources and Electricity

Board, Oslo.

H. Grip.
Nordic Hydrology, Vol 4, No 3, p 191-205, 1973.
10 fig, 3 tab, 7 ref.

Descriptors: *Water balance, Mathematical models, Recession curves, Rainfall-runoff rela-tionships, Hydrograph analysis, Water storage, Soil moisture, Hydrologic cycle.

A simple deterministic model, that needs little input-data is based on an analysis of the recession curve. Input data consist of time-series of precipitation, initial values of storage in upper and lower soil storages and in interception storage, and initial runoff. Output data are time series of evapotranspiration, interception, upper and lower soil storages and runoff, all given as 2-hour mean values. (Knapp-USGS) W74-01126

NUMERICAL SIMULATION OF THE RAIN-FALL-RUNOFF PROCESS ON A DAILY BASIS, Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering. S. A. Nielsen, and E. Hansen.

Nordic Hydrology, Vol 4, No 3, p 171-190, 1973. 9 fig. 3 tab. 8 ref.

Descriptors: *Simulation analysis, *Rainfall-ru-noff relationships, Streamflow forecasting, Water storage, Soil moisture, Snowmelt, Overland flow, Base flow, Subsurface runoff, Numerical analysis, Hydrographs.

A digital model was developed for the simulation of the rainfall-runoff process of rural watersheds. Input data are daily values of precipitation and temperature together with mean monthly potential evapotranspiration. The model produces daily values of streamflow as well as information on the time variation of the soil moisture content. The model operates by accounting continuously for the moisture content in four different and mutually interrelated storages representing physical elements in the watershed. Simulations demonstrate that the main shortcoming of the model are due to the lack of a procedure accounting for frozen ground dur-ing extended periods of frost. (Knapp-USGS) W74-01127

DEVELOPMENT OF A CONCEPTUAL DETERMINISTIC RAINFALL-RUNOFF MODEL, Swedish Meteorological and Hydrological Inst., Stockholm.

S. Bergstrom, and A. Forsman. Nordic Hydrology, Vol 4, No 3, p 147-170, 1973. 19 fig, 3 tab, 5 ref. Descriptors: *Rainfall-runoff relationships. Mathematical models, Infiltration, Percolation, Runoff forecasting, Streamflow forecasting, Hydrographs.

A simple conceptual rainfall-runoff model was developed at the Swedish Meteorological and Hydrological Institute. The HBV-2 Model is based on lumped-parameter approximations to the physical laws governing infiltration, percolation and ru-noff formation. The time interval is one day. The model structure includes soil moisture storage, upper zone storage, and lower zone storage. A procedure for evaluating the parameter values is given. Examples of applications to several test catchments in various hydrologic settings are included. (Knapp-USGS)

RESERVOIR MECHANISM IN AN AQUIFER OF ARBITRARY BOUNDARY SHAPE, Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering. For primary bibliographic entry see Field 02F. W74-01129

INTERNATIONAL SCIENTIFIC AND TECHNI-CAL COOPERATION IN THE FIELD OF WATER PROBLEMS (MEZHDUNARODNOYE NAUCHNO-TEKHNICHESKOYE SOTRUD-VODNYKH **OBLASTI** NICHESTVO

PROBLEM), Akademiya Nauk SSSR, Moscow. Institut Vod-For primary bibliographic entry see Field 06E. W74-01138 nykh Problem.

DIVISION OF THE UNITED STATES INTO RE-GIONS ACCORDING TO COPHASAL FLUC-TUATIONS OF ANNUAL RUNOFF (RAYONIROVANIYE TERRITORII SSHA PO SINFAZNOSTI KOLEBANIY GODOVOGO STOKA REK),

or primary bibliographic entry see Field 02E. W74-01140

CHEMICAL RELATIONSHIPS BETWEEN SUR-FACE WATER AND THE GROUND IN SOUTH

Miami Univ., Coral Gables, Fla. For primary bibliographic entry see Field 02K.

UTILIZATION OF REMOTE SENSING IN RIVER BASIN STUDIES,

Army Engineer Waterways Experiment Station, Vicksburg, Miss. For primary bibliographic entry see Field 05A. W74-01154

OBJECTIVE REGIONALIZATION OF PEAK

Agricultural Research Service, Chickasha Okla. Soil and Water Conservation Research Div. For primary bibliographic entry see Field 04D. W74-01174

HYDRODYNAMIC MODELING OF TWO-DIMENSIONAL WATERSHED FLOW, Illinois Univ., Urbana. Dept. of Civil Engineering. V. T. Chow, and A. Ben-Zvi.

ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10172, p 2023-2040, November 1973. 4 fig, 1 tab, 28 ref, append. NSF Grants GK-1155 and GK-11292.

Descriptors: *Mathematical models, *Simulation analysis, *Rainfall-runoff relationships, Floods, Runoff, Water yield, Finite element analysis. Unsteady surface flow over watersheds was modeled hydrodynamically by a system of quasilinear partial differential equations for two velocity components and a flow depth at any point on the watershed. Computer solution is possible by a difference scheme based on the combination of the Lax-Wendroff scheme with Burstein-Lapidus modifications. A numerical example is given for the solution of watershed flow resulting from a uniform rainfall intensity and finite duration. Preliminary results indicate that the model is suitable for the study of watershed flow. (Knapp-HSGS) W74-01278

PROCESSING AND STORAGE OF HYDROMETEOROLOGICAL DATA IN THE ATMOSPHERIC ENVIRONMENT SERVICE, Atmospheric Environment Service, Toronto (Ontario).

For primary bibliographic entry see Field 07C. W74-01290

COMPUTER UTILIZATION OF HYDROLOGI-CAL DATA FOR NORTH NASHWAAKSIS REPRESENTATIVE BASIN,

New Brunswick Univ., Fredericton. Dept. of Civil Engineering. For primary bibliographic entry see Field 07C.

W74-01294

W74-01295

DATA ACQUISITION AND STORAGE FOR RESEARCH WATERSHEDS, Guelph Univ. (Ontario). School of Engineering. For primary bibliographic entry see Field 07C.

THE MASS BALANCE OF THE SEA ICE OF

THE ARCTIC OCEAN,
Department of Energy, Mines and Resources, Ottawa (Ontario). Polar Continental Shelf Project.
For primary bibliographic entry see Field 02C. W74-01374

SHORT-TERM SNOW MELT AND ABLATION DERIVED FROM HEAT- AND MASS-BALANCE

MEASUREMENTS,
Department of the Environment, Ottawa (Ontario). Waters Branch. For primary bibliographic entry see Field 02C. W74-01380

SIMULATING THE BEHAVIOR OF A MULTI-UNIT, MULTI-PURPOSE WATER-RESOURCE SYSTEM,

Harvard Univ., Cambridge, Mass. For primary bibliographic entry see Field 06A. W74-01468

PHYSICAL SYSTEM MODELLING AS A TOOL IN WATER RESOURCE PLANNING, Department of the Environment, Ottawa (On-

tario; H. M. Hill, and J. Bergsima. Engineering Journal, Vol 56, No 9, p 26-30, September 1973. 1 fig, 6 ref.

Descriptors: Water resources. *Comprehensive planning, *Watersheds (Basins), *Institutional constraints, *Multiple-purpose projects, *Systems analysis, Hydrology, Water quality, Physical proanalysis, hydrology, water quanty, rhysical pro-perties, Optimum development plans, Social aspects, Economics, Benefits, Mathematical models, Water supply, Waste treatment. Identifiers: *Canada (Grand River watershed),

The effectiveness of a water resources com-prehensive plan is determined by to what extent all

*Environmental quality, Planning agencies.

Group 2A-General

relevant variables are considered, and to what extent institutional characteristics are understood so that the programs of all agencies concerned are directed towards fulfillment of the one, intrarelated, comprehensive plan. Such planning is multiobjective, multi-jurisdictional, and multidiscipline, and involves multiple agencies, water uses, and programs. The planning function is characterized by economic development, environmental quality, and social well-being. Comprehensive planning and modelling of water resources in Canada are discussed. Institutional constraints on planning are analyzed, and a generalized operational framework of a typical Canadian watershed, the Grand River watershed in Ontario, is used to reflect the multiple-purpose nature of water resources planning. Included are water quality, water supply, and waste treatment operations. The major function of planning boards in Ontario is discussed, and hydrologic and water quality modeling are discussed to examine how the natural system analysis, and thus the direction of the planning function, is influenced by the institutional characteristics. It is concluded that no one agency can undertake water resources modeling to optimize a total hydrologic system. (Bell-Cornell) W74-01487

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT.
VOLUME 2. HYDROLOGIC DATA MANAGE-

MENT, Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.

For primary bibliographic entry see Field 02E. W74-01642

2B. Precipitation

PRECIPITATION VARIABILITY OVER NORTH

CAROLINA, North Carolina State Univ., Raleigh. Dept. of Geosciences.

W. J. Saucier, A. H. Weber, and C. K. Bayne. Available from the National Technical Information Service as PB-225 123/9, \$5.25 in paper copy, \$1.45 in microfiche. Water Resources Research Inst., University of North Carolina. Report No. 84, August 1973. 185 p, 22 fig, 14 tab, 55 ref, 12 append. OWRR A-061-NC (3).

Descriptors: *Rainfall, Precipitation intensity, Droughts, *North Carolina, *Weather patterns.

Identifiers: *Precipitation variability, *Rainfall distribution patterns.

Variability of precipitation is analyzed in detail for records of 40 to 50 years or more. The probability of occurrence of wet or dry days is calculated for various thresholds of rainfall. Using the Freyerherm-Bark model, tables of initial and transitional probabilities and confidence limits are calculated. Tables of sequences of wet and dry days are also calculated. Computer programs and example problems are presented. Monthly total precipitation is calculated by station and tables and maps are given for the monthly means and of variance about the means. Long-term variations in precipitation were found in analyzing 40-year data series. Variations due to tropical storms are also analyzed. Conclusive evidence is presented that long-term variations do occur and affect nearby locations quite differently. (McJunkin-North Carolina) W74-01111

COASTAL PROCESSES AND BEACH DYNAM-ICS AT SHEBOYGAN, WISCONSIN, JULY,

Williams Coll., Williamstown, Mass. For primary bibliographic entry see Field 02H. W74-01130

COMPARISON OF GAGE AND RADAR METHODS OF CONVECTIVE PRECIPITATION

MEASUREMENT, National Oceanic and Atmospheric Administration, Coral Gables, Fla. Experimental Meteorology Lab.

A. Herndon, W. L. Woodley, A. H. Miller, A. Samet, and H. Senn.

National Oceanic and Atmospheric Administration Technical Memorandum ERL OD-18, March 1973. 67 p, 20 fig, 11 tab, 30 ref.

Descriptors: *Rainfall intensity, *Rain gages, *Radar, *Florida, Correlation analysis, Data collections, Remote sensing, Evaluation, Convection, Cloud seeding, Heat transfer, Rainfall.

During the summer of 1972 convective rainfall over south Florida was estimated by two collocated, calibrated 10-cm radars (UM/10-cm of the University of Miami and the WSR-57 of the National Hurricane Center) and compared with the rainfall as determined by rain gages in small cluster arrays. These comparisons were variable, but in the mean both radars tended to underestimate the rainfall, particularly the heavier showers. On a daily basis, the mean absolute percentage differences for the periods of radar operation ranged between 35% and 40%. The radars were within a factor of two of the cluster standard nearly 70% of the time. Comparison of this finding with that in the gaging section suggests that the radars approximated a gage network of 20-30 sq mi/gage. The performances of the radars were very similar. The correlations between gage and radar rainfalls were 0.87 and 0.84 for the UM/10-cm and WSR-57 radars, respectively. The correlation between radar rainfalls for 46 common showers was 0.94. In the context of Experimental Meteorology Laboratory's cloud seeding experiments, neither gage nor radar methods of convective precipitation evaluation is entirely adequate by itself unless the effect of seeding on precipitation is unexpectedly large (greater than a factor of two). (Woodard-USGS) W74-01149

THE SOVIET DARMS PROGRAM--TWENTY YEARS OF DEVELOPMENT, DEPLOYMENT, AND DATA,

National Science Foundation, Washington, D.C. Office of Polar Programs. For primary bibliographic entry see Field 07C. W74-01157

BAROMETRIC PRESSURE MEASUREMENTS FROM BUOYS DURING AIDJEX 1972, Washington Univ., Seattle. For primary bibliographic entry see Field 07B.

A RESONANT CAPSULE PRESSURE TRANS-DUCER FOR DATA BUOYS, Koilsman Instrument Corp., Syosset, N.Y.

For primary bibliographic entry see Field 07B. W74-01160

W74-01159

W74-01290

THE UNION OF THE COLUMBIA RIVER AND THE PACIFIC OCEAN -- GENERAL FEA-Washington Univ., Seattle. Dept. of Oceanog-

For primary bibliographic entry see Field 02L. W74-01183

PROCESSING AND STORAGE OF HYDROMETEOROLOGICAL DATA IN THE ATMOSPHERIC ENVIRONMENT SERVICE, Atmospheric Environment Service, Toronto (Ontario). For primary bibliographic entry see Field 07C.

CLIMATOLOGICAL STATIONS IN CALIFOR-NIA, 1971.

California State Dept. of Water Resources, Sacremento.

For primary bibliographic entry see Field 07C. W74-01383

SIMULATION MODELS FOR WATER--RESOURCE SYSTEMS: THEIR UTILITY IN MEASURING PHYSICAL AND ECONOMIC EF-FECTS OF WEATHER FORECASTING AND WEATHER MODIFICATION: SUMMARY RE-

North Carolina Univ., Chapel Hill. For primary bibliographic entry see Field 03B. W74-01463

SOIL AND WATER CONSERVATION ON ARA-BLE LANDS

Soils Inst., Tehran (Iran). Soil and Water Conservation Div. For primary bibliographic entry see Field 03F. W74-01633

2C. Snow, Ice, and Frost

PROBLEMS IN HYDROLOGY OF GLACIERS AND GLACIERIZED AREAS (PROBLEMY GIDROLOGII LEDNIKOV I LEDNIKOVYKH RAYONOV),

Akademiya Nauk SSSR, Moscow. Institut Geografii.

G. A. Avsyuk, V. M. Kotlyakov, V. G. Khodakov, and G. N. Golubev.

Vodnyye Resursy, No 2, p 3-20, 1973. 7 fig, 1 tab, 27 ref.

Descriptors: *Glaciohydrology, *Glaciers, Mountains, Ice, Snow, Firn, Melt water, Snowmelt, Melting, Ablation, Regimen, Hydrologic cycle, Water balance, Precipitation (Atmospheric), Runoff, Heat balance, International Hydrological Decade, Maps, Equations.

Identifiers: *USSR, Glacier mass balance,

Paleoglaciology.

According to latest estimates, glaciers in the USSR cover 81,900 sq km. The volume of water stored in the glaciers is 13,750 cu km or about three times the annual runoff volume of all USSR rivers. In mountainous regions, glaciers cover about 21,000 sq km. The volume of ice is more than 2,800 cu km, and the water equivalent of this volume is about 2,450 cu km. A glaciological method is presented for calculating average precipitation and average long-term meltwater discharge at the boundary of glacier nourishment, and a map shows these values for the USSR and adjoining lands. An equation is given for the water-ice balance of a glacier basin, and possibilities of measuring and calculating major items in this balance are considered. A scheme is A scheme is developed for calculating glacier internal nourishment, and results are presented of research on water regimen of glaciers as a whole and of individual ice-formation zones on glaciers. Successes in artificial augmentation of melting by surface dusting of glaciers and in computations and forecasts of floods and other consequences of catastrophic movements of pulsating glaciers are described. Possibilities of applying results of glacier mass balance studies to paleoglaciological research are noted, and basic directions of glacier investigations following the International Hydrological Decade in 1974 are outlined. (Josef-W74-01132

ARCTIC DATA BUOYS AND AIDJEX, Washington Univ., Seattle. For primary bibliographic entry see Field 07B. W74-01156

SINGLE-VELOCITY METHOD IN MEASURING DISCHARGE,

Department of the Environment, Ottawa (Ontario). Inland Waters Directorate. P. W. Strilaeff, and W. Bilozor.

Technical Bulletin No 75, 1973. 21 p, 5 fig, 6 tab,

Descriptors: *Streamflow, *Flow measurement, *Flow rates, *Canada, *Cold regions, Ice cover, Gaging stations, Hydrologic data, Velocity, Methodology, Mathematical studies, Hydrographs, Discharge measurement.

Identifiers: *Manitoba (Canada), *Northwest Territories (Canada), Single-velocity method.

In 1968 an analysis was made of discharge measurement records for a number of gaging stations located in Manitoba, Canada, and Northwest Territories. The purpose of the analysis was to discover the relationship between discharge mea-surements made on the basis of single velocity observations in the cross section, and discharge mea-surements made using traditional techniques. The relationship appeared to be very promising and the results were documented. This summary report is based on a more intensive and exhaustive analysis of the relationship and suggests procedures to be followed when applying the single-velocity method in discharge measurement work. (Woodard-USGS) W74-01161

WATER RESOURCES,

National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. For primary bibliographic entry see Field 07C. W74-01168

DEVELOPMENT OF A TIME-SPACE PREDICTION TECHNIQUE TO EVALUATE SNOW-PACKS IN AND ADJACENT TO FOREST

Arizona Univ., Tucson. Dept. of Watershed Management.

For primary bibliographic entry see Field 03B. W74-01231

ACQUISITION, STORAGE AND PROCESSING OF GLACIER INVENTORY DATA, Department of the Environment, Ottawa (Ontario). Inland Waters Branch.

For primary bibliographic entry see Field 07C. W74-01292

SEASONAL VARIATION OF CHEMICAL PARAMETERS IN ALASKAN TUNDRA LAKES, Skidmore Coll., Saratoga Springs, N. Y. Dept. of Biology.

For primary bibliographic entry see Field 05B. W74-01347

SIMULTANEOUS DETERMINATION OF MAN-GANESE, COPPER, ARSENIC, CADMIUM, AN-TIMONY AND MERCURY IN GLACIAL ICE BY RADIOACTIVATION, Naval Undersea Center, San Diego, Calif.

For primary bibliographic entry see Field 05A. W74-01361

THE MASS BALANCE OF THE SEA ICE OF

THE MASS BALANCE OF THE SEA ICE OF THE ARCTIC OCEAN, Department of Energy, Mines and Resources, Ot-tawa (Ontario). Polar Continental Shelf Project. R. M. Koerner.

Journal of Glaciology, Vol 12, No 65, p 173-185, 1973. 4 fig, 5 tab, 13 ref.

Descriptors: *Water balance, *Sea ice, *Arctic Ocean, Melting, Ablation, Regimen. Identifiers: Mass balance.

From data taken on the British Trans-Arctic Expedition it was calculated that 9% of the Arctic Ocean surface between the North Pole and Spitsbergen was hummocked or ridged ice, 17% was unridged ice less than a year old, 73% was unridged old ice and 0.6% was ice-free. The mode of 250 thickness measurements taken through level areas of old floes along the entire traverse lies between 2.25 and 2.75 m. The mean end-of-winter thickness of the ice was calculated to be 4.6 m in the Pacific Gyral and 3.9 m in the Trans-Polar Drift Stream. From measurements of the percentage coverage and thickness of the various ice forms, it was calculated that the total annual ice accumulation in the Arctic Ocean is equivalent to a continuous layer of ice 1.1 m thick. 47% of this accumulation occurs in ice-free areas and under ice less than 1 year old; 20% of the total ice production is either directly or indirectly related to ridging or hummocking. An ice-ablation rate of 500 kg per sq m was measured on a level area of a multiyear floe. Greatest melting occurs on new hummocks and least on old smooth hummocks. The annual balance of ice older than 1 year but younger than multiyear ice was calculated from a knowledge of ice-drift patterns and the percentage coverage of first-year ice. The same calculations give a meanmaximum drift period of 5 years for ice in the Trans-Polar Drift Stream and 16 years in the Pacific Gyral. For the period February 1968 to May 1969 the annual ice export was 5,580 cu km. (Knapp-USGS) W74-01374

ICEBERGS AS A FRESH-WATER SOURCE: AN APPRAISAL, Cold Regions Research and Engineering Lab.,

Hanover, N. H.
W. F. Weeks, and W. J. Campbell.
Journal of Glaciology, Vol 12, No 65, p 207-233,
1973. 16 fig, 1 tab, 36 ref.

Descriptors: *Icebergs, *Water sources, Water conveyance, Water costs, Antarctic, Water yield improvement.

A history of the idea of transporting large icebergs to arid regions to provide a fresh-water source is presented. Only in the Antarctic are supplies of large tabular icebergs available. Data on the size distribution of these icebergs are reviewed and it is concluded that icebergs of almost any desired size can readily be located. Steady-state towing velocities of different sized icebergs are calculated based on estimates of the drag of the icebergs and the bollard pull of tugs. Because drag increases with velocity squared, large icebergs can only be towed at very slow velocities (<0.5 m/s). However, tugs that can be built within the capabilities of current technology are capable of towing extremely large icebergs. Although melting losses are significant and may be excessive for small icebergs, when large icebergs are towed, large amounts of ice are left when the iceberg arrives at its destination. Towing trajectories, travel times, and ice delivery rates are calculated for optimum routes between Amery Ice Shelf and Western Australia and the Ross Ice Shelf and the Atacama Desert. Forces included in these calculations are towing, air, water, gradient current and Coriolis. Transit times exceed 107 d and 145 d with over 50% of the initial ice delivered. After total towing charges are paid, it is possible to deliver ice to Western Australia for 1.3 mills/per cu m of water and to the Atacama Desert region for 1.9 mills/per cu m. The water delivered by the operation of one super tug alone would irrigate 16,000 sq km. Problems related to both iceberg transport and processing are reviewed and although substantial problems do exist, they appear to be within the capabilities of current technology. (Knapp-USGS) W74-01375

ICE CALVING INTO THE PROGLACIAL GENERATOR LAKE, BAFFIN ISLAND, N.W.T., CANADA,

Deptment of the Environment, Ottawa (Ontario). Glaciology Div. G. Holdsworth.

Journal of Glaciology, Vol 12, No 65, p 235-250, 1973. 10 fig, 14 ref, 3 append.

Descriptors: *Glaciers, *Icebergs, *Lake ice, Ablation, *Canada, Melting, Water balance, Water level fluctuations. Identifiers: *Calving (Icebergs), Baffin Island.

The morphology of the margin of Barnes Ice Dap, Baffin Island, at the proglacial Generator Lake is described. Types of calving that take place into the lake are discussed, particularly an observed calving in July 1970 when an ice-ramp of about 0.4 million cu m volume broke off due to a rise in lake level. Bending analyses throw some light on the calving mechanism. At Generator Lake, the margin of Barnes Ice Cap has recently retreated about five times further than the retreat of the adjacent land-based margin. The present ice front is characterized by cliffs and ramps in the approximate ratio of 1:1. A cliff is associated with an immediately grounded ice margin and a ramp is defined as a tapered projecting tongue of ice detached from the bottom of the lake but not necessarily floating in equilibrium. Cliffs occur in water shallower than about 30 m, whereas ramps predominate in water deeper than about 30 m. Typically, water depth exceeds 50 m just off the ramps. (Knapp-USGS) W74-01376

FLOW OF A VALLEY GLACIER WITH A SOLID FRICTION LAW, Centre National de la Recherche Scientifique,

Grenoble (France). Laboratoire de Glaciologie. L. Reynaud.

Journal of Glaciology, Vol 12, No 65, p 251-258, 1973. 7 fig, 1 tab, 4 ref.

Descriptors: *Glaciers, *Rheology, *Friction, Melting, Velocity, Glaciology, Flow. Identifiers: Canada (Athabasca Glacier).

Friction on the bed of a glacier is assumed to obey Coulomb's law of solid friction in the presence of interstitial pressure. According to this, the friction is a maximum at certain places in the bottom of the valley. Assuming Glen's nonlinear creep law, the steady-state flow of ice along a regular cylindrical channel of parabolic section was calculated. The results reproduce to high accuracy the distribution of velocity measured on the Athabasca Glacier. (Knapp-USGS) W74-01377

SEISMIC EVIDENCE FOR GLACIER MOTION. Alaska Univ., College. Geophysical Inst. D. VanWormer, and E. Berg. Journal of Glaciology, Vol 12, No 65, p 259-265, 1973. 6 fig, 1 tab, 2 ref.

Descriptors: *Glaciers, *Movement, *Seismic studies, *Alaska, Shear, Strain. Identifiers: *College Fiord (Alas).

Unusual seismic signals with weak P phases and well-developed monochromatic shear-wave trains were recorded and their sources located near College Fiord, Alaska. Epicentral determinations show that they originate on or near glaciers. Some of the events have equivalent earthquake mag-nitudes of 2.0 to 2.5. These energy sources seem to be compatible with spasmodic glacier movement. Smaller events occur often--as many as 60 per day. (Knapp-USGS)
W74-01378

Group 2C-Snow, Ice, and Frost

ON THE FORMATION OF SMALL MARGINAL LAKES ON THE JUNEAU ICEFIELD, SOUTH--EASTERN ALASKA, U.S.A., Turku Univ. (Finland). Institutum Geographicum.

M. Seppala.

Journal of Glaciology, Vol 12, No 65, p 267-273, 1973. 7 fig, 9 ref.

Descriptors: *Lakes, *Glaciers, *Wind erosion, *Blowouts. Glaciohydrology, Glaciology, *Alaska.

Identifiers: Proglacial lakes, *Juneau Icefield (Alas).

Small 'moat lakes', sometimes empty, sometimes filled with water, are encountered on the edges of glacial firn areas of the Juneau Icefield in southeastern Alaska. The lake basins are primarily blowouts formed as a result of wind erosion. On the Juneau Icefield strong winds blow from the southern sector, principally from the southeast, and cause drifting. The lake basin develops in such a way that meltwater from the surface of the glacier and the slopes of the nunatak collects in the depression originially made by the wind. (Knapp-USGS) W74-01379

SHORT-TERM SNOW MELT AND ABLATION DERIVED FROM HEAT- AND MASS-BALANCE MEASUREMENTS, Department of the Environment, Ottawa (On-

tario). Waters Branch. P. M. B. Pohn.

Journal of Glaciology, Vol 12, No 65, p 275-289, 1973. 6 fig, 3 tab, 20 ref.

Descriptors: *Snowmelt, *Heat balance, *Water balance, *Glaciers, Ablation, Melting, Meteorology, Meteorological data, Heat transfer.

Daily melt rates of glaciers can be determined with a maximum relative error of 20% by evaluating the ice matrix density (in contrast to the total snow density) of the immediate surface and subsurface layers and by evaluating the decrease in volume. Neglecting the ice-density changes in the subsurface layer would, on the average, reduce the daily melt rates by 22%. The heat-balance approach gives satisfactory results on a daily basis and a close agreement for longer periods. The distribution of the total absorbed energy between the dif-ferent components for the whole period was as follows: all-wave net radiation 44%, sensible heat 48%, and the latent heat (condensation), 8%. This distribution corresponds to a pattern often encountered over snow surfaces at low elevations in midsummer, when the convective heat is equal to or even exceeds the radiative heat, whereas the condensation process is a rather minor heat source. The heat-balance approach represents a useful method for obtaining melt rates for periods of several days. Applying such an approach, the use of a lumped melt index like the degree-day factor can be avoided. (Knapp-USGS) W74-01380

COMPARISON OF THE SNOW RESISTO-GRAPH WITH THE RAM PENETROMETER, Montana State Univ., Bozeman. Dept. of Earth

W. St. Lawrence, and C. C. Bradley. Journal of Glaciology, Vol 12, No 65, p 315-321, 1973. 4 fig, 5 ref.

Descriptors: *Snowpacks, *Avalanches, *Instrumentation, Data collections, Strength, Snow surveys, Calibrations. *Snow Identifiers: resistograph,

penetrometer.

Comparative tests of the snow resistograph with the ram penetrometer indicate that there is a high degree of correlation between the two instruments despite fundamental differences in operation. It is probable therefore that the two instruments are measuring essentially the same parameters and may be used interchangeably. The resistograph has a large advantage over the ram penetrometer, in terms of speed and ease of operation, and in its capacity to measure the strength of very weak snow. (Knapp-USGS)

GEOPHYSICAL MEASUREMENTS OF THE THICKNESS OF THE MALYY AZAU GLACIER (GEOFIZICHESKIYE OPREDELENIYA MOSHCHNOSTI LEDNIKA MALYY AZAU),

Moscow State Univ. (USSR). Problemnaya Laboratoriya Kompleksnogo Kartografirovaniya i

L. A. Ushakova, A. V. Bryukhanov, and A. P. Tishchenko.

Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 5, p 99-101, September-October 1971. 1 fig.

*Glaciers, *Measurement Descriptors: Gravimetry, *Gravimetric analysis, Gravimeters, Density, Ice, Glacial drift.
Identifiers: *USSR (Malyy Azau Glacier), Glacier

The gravity method was used to measure the thickness of the Malyy Azau Glacier (area--8.49 sq km; length--7.58 km) on the southern slope of Mount Elbrus in the Caucasus. Average thickness of the glacier tongue, calculated from Bouguer effects, is 80-100 m, and the maximum thickness is 150 m. The gravity method is a promising method for measuring the thickness of mountain glaciers, but, because of errors involved, must be combined with seismic or radar sounding. (Josefson-USGS) W74-01390

USE OF ISOTOPIC METHODS TO DETER-MINE PRESENT RATES OF SNOW ACCUMU-LATION IN ANTARCTICA (ISPOL'ZOVANIYE IZOTOPNYKH METODOV OPREDELENIYA SOVREMENNOY SKORSTI NAKOPLENIYA SNEGA V ANTARKTIDE),

Akademiya Nauk SSSR, Moscow. Institut Geokhimii i Analiticheskoi Khimii. V. D. Vilenskiy, R. V. Teys, V. V. Yemel'yanov,

and S. N. Kochetkova. Geokhimiya, No 9, p 1071-1082, September 1972. 5 fig, 4 tab, 19 ref.

Descriptors: *Antarctic, *Snow, *Snow cover, *Isotope studies, *Analytical techniques, Stable isotopes, Deuterium, Oxygen isotopes, L radioisotopes, Radioactivity, Depth, Seasonal. Identifiers: *USSR (Antartica).

Determination of present rate of snow accumulation at Molodezhnaya, Mirnyy, and Vostok Antarctic stations by means of isotopic methods is discussed. To determine rate of snow accumula-tion and to identify annual layers in modern glacial deposits of coastal and central regions of the Antarctic continent, seasonal variations in radioactivity and variations in stable isotope contents be considered. The accurary of determining mean rate of snow accumulation from variations in Pb-210 concentration with depth (in Pb-210 determinations carried out on snow samples cor-responding to an accumulation period of about 10 years) cannot be improved by using thinner cut samples because of large variations in the Pb-210 concentration. To estimate irregularity of presentday snow accumulation at different points in the same region, it is recommended that three zones having different radioactivities be identified in the snow cover deposited since 1955. Simultaneous application of several isotopic methods have made application or several isotopic methods have made it possible to determine the present snow accumulation rate at Mirnyy to be about 30 g/sq cm/yr, at two points near Molodezhnaya to be about 15 and 22 g/sq cm/yr, and at Vostok to be about 3 g/sq cm/yr, (Josefson-USGS) W74-01393 SPECTRAL ABSORPTION OF SOLAR RADIA-TION IN ALPINE SNOWFIELDS.

Oregon State Univ., Corvallis. Dept. of Oceanography. H. Curl, Jr., J. T. Hardy, and R. Ellermeier.

Ecology. Vol 53, No 6, p 1189-1194. 1972. Illus. Identifiers: Absorption, Algae, Alpine, Regression, Seasons, *Solar radiation, *Spectral absorption, *Snowfields.

Penetration of solar radiation into snow at various times of the year was measured with a spectral radiometer. Light absorption obeys a y ± axn law where n varies from 0.71 to 2.10. The absorption coefficient n decreases with increasing snow density. The 1% of surface value of total energy occurs at a snow depth of approximately 18 cm in winter, increasing to a maximum of 110 cm in late summer when snow density is near its maximum. Penetration of 0.1% of the surface radiation is shown to coincide with the approximate date and depth of snow pack for the first spring bloom of snow algae, implying that increasing light penetra-tion may initiate germination of overwintering stages.—Copyright 1973, Biological Abstracts, Inc.

2D. Evaporation and Transpiration

POTENTIAL USEFULNESS OF ANTITRANS-PIRANTS FOR SOLUTION OF SOME WATER SUPPLY, PLANT GROWTH, AND ENVIRON-MENTAL PROBLEMS, California Univ., Davis. Dept. of Water Science

and Engineering.
For primary bibliographic entry see Field 03B. W74-01105

SALINIZATION UNDER IRRIGATED CULTIVATION, Haryana Agricultural Univ., Hissar (India). Dept. of Agricultural Engineering. For primary bibliographic entry see Field 03F.

LEAF TEMPERATURES, DIFFUSION RE-SISTANCES, AND TRANSPIRATION, Macquarie Univ., North Ryde (Australia). School of Earth Sciences.

E. T. Linacre.

W74-01238

Agric Meteorol. Vol 10, No 4/5, p 365-382. 1972, Il-

Identifiers: *Diffusion resistance, Grape vine, *Leaf temperature, Resistances, Temperatures, *Transpiration.

A simple model of the energy flows about a leaf yields new expressions for the temperature, external diffusion resistance, internal diffusion resistance and the transpiration rate. The effects are considered of either coating the leaf to make its surface impermeable to water vapor, or wetting the leaf surface, or shading it. Four methods of deriving a leaf's external resistance and 4 for determining the transpiration rate were deduced, and compared using data from field measurements on intact grape vine leaves. The results obtained by the various methods are roughly similar.-Copyright 1973, Biological Abstracts, Inc.
W74-01254

DIURNAL CHANGES IN TRANSPIRATION AND DAILY PHOTOSYNTHETIC RATER OF SEVERAL CROP PLANTS.

Agricultural Research Service, Watkinsville, Ga. J. E. Pallas, Jr.

Crop Sci. Vol 13, No 1, p 82-84, 1973.
Identifiers: "Crop yield, Daily, "Diurnal changes, Growth, "Photosynthesis, "Transpiration, Measurement, Cotton, Bell pepper, Peanuts, Soybeans, Bermudagrass.

Measurements of photosynthesis and transpiration of soil-grown, growth chamber-cultured cotton (Gossypium hirsutum L. cv. 'Empire'), bell pepper (Capsicum frutescens L. cv. 'California Wonder'), peanut (Arachis hypogaea L. cv. 'Florigiant'), soybean (Gossypium max Merr. cv. 'Lee) and bermudagrass (Cynodon dactylon L.) plants were made during 14-hr photoperiods: irradiance 1.17. (joules/cm2/min, day-night temperature 30 degrees C, and CO2 concentration 310 micro1/1. A diurnal trend in both photosynthesis and transira-tion was evidenced by the dicots but not the monocot. The sinusoidal nature of the curves suggest endogenous rhythm changes in diffusive resistance and/or biochemical activity. As much as 2-fold changes in cotton and peanut photosynthesis were recorded compared to approximately 30% change in bell pepper and soybean photosynthesis. These findings jeopardize the relevancy of shorttime photosynthetic measurements used in some screening techniques.—Copyright 1973, Biological Abstracts, Inc. W74-01597

STOMATAL-DIFFUSION RESISTANCE AND WATER POTENTIAL OF SOYBEAN AND SORGHUM LEAVES, Kansas Agricultural Experiment Station, Manhat-

For primary bibliographic entry see Field 03F. W74-01605

WATER USE BY PERENNIAL EVERGREEN PLANT COMMUNITIES IN AUSTRALIA AND PAPUA NEW GUINEA, Queensland Univ., Brisbane (Australia). Dept. of

Australian Journal of Botany, Vol 20, No 3, p 272-299, December 1972. 13 fig, 4 tab, 46 ref, append.

Descriptors: *Water utilization, Water requirements, Ecology, Plant growth, Plant populations, *Drought tolerance, Arid lands, Environment, Climatic data, *Australia, *Water balance, matic data, "Australia, "Water balance, Ecosystems, Model studies, Evapotranspiration. Identifiers: "Papua New Guinea, "Evergreens (Perennial), Eucalyptus.

Availability of water is the major ecological factor determining the productivity of plant communities in many areas of the world. Comparison of the water use of plant communities growing in dif-ferent habitats depends on establishing relationships between community evapotranspiration and parameters which express the evaporative power of the atmosphere and the availability of water in the soil to plant roots. The water balance model developed uses empirical relationships between monthly values of precipitation, evapotranspira-tion, pan evaporation, drainage (infiltration and percolation) and extractable soil water. There is no doubt that this model obscures many finer processes which operate continuously within the ecosystem, However, the purpose is to discuss the water balance of perennial evergreen plant communities (usually natural) in Australia and Papua New Guinea and eventually from this to model the growth of these ecosystems. At present, signifi-cant changes in biomass of these ecosystems can only be defined with difficulty. Refined aerodynamic techniques in which carbon dioxide fluxes above a plant community are used may eventually be appliacable to long-term continuous monitoring of deterogeneous, irregularly struc-tured plan communities. (Black-Arizona) W74-01634

2E. Streamflow and Runoff

A STOCHASTIC MODEL OF STREAMFLOW BASED ON THE THEORY OF FUNCTIONS OF MARKOY PROCESSES, Arizona Univ., Tucson.

C. C. Kisiel, J. L. Denny, and S. J. Yakowitz. Available from the National Technical Informa-Available from the National Technical Informa-tion Service as PB-225 146/0, \$3.00 in paper copy, \$1.45 in microfiche. Project Completion Report, August 1971. 8 p, 6 ref. OWRR A-023-ARIZ (1). 14-31-0001-3203.

Descriptors: *Streamflow forecasting, *Statistical models, *Markov processes, *Stochastic processes, Flow measurement, Correlation analysis, Hydrographs, Analytical techniques, Evalua-tion, *Arizona, Streams.

Two streams (Rilliot and Sabino Creeks) in southern Arizona were studied with particular reference to understanding their random behavior. Analysis gives unexpectedly strong evidence that certain streamflow measurements possess the statistical characteristics of a Markov chain of statistical charger than six or seven. This permits statistical estimation and hypothesis testing of the parameters of the stream, leads to a simple but realistic nonlinear model of streamflow, and allows a simple method of predicting future streamflow using past streamflow measurements. In addition, statistical evidence appeared to support the contention that urbanization in the vicinity of the stream forces a trend toward dry readings at the stream's measuring station. (Woodard-USGS) W74-01123

DIVISION OF THE UNITED STATES INTO RE-GIONS ACCORDING TO COPHASAL FLUC-TUATIONS OF ANNUAL RUNOFF (RAYONIROVANIYE TERRITORII SSHA PO SINFAZNOSTI KOLEBANIY GODOVOGO STOKA REK).

N. V. Lalykin. Vodnyye Resursy, No 2, p 183-189, 1973. 3 fig, 2 tab. 3 ref.

Descriptors: *United States, *Runoff, *Annual, *Fluctuations, Variability, Correlation analysis, Cycles, Rivers, River basins, Maps. Identifiers: *USSR.

Data used to divide the United States into 13 regions according to the character of cyclic fluctuations of annual runoff were derived from surfacewater records collected by the U.S. Geological Survey between 1900 and 1959 (Water Supply Papers 1301-1318 and 1721-1738). Runoff cycles for each region are described, and a method is proposed for determining size of rivers from pat-terns of areal variability of the coefficients of correlation between runoff on individual rivers. Relations of coefficients of correlation of annual runoff on small lowland and mountain streams to distance centers of gravity of the basins are graphed, and areas of cophasal fluctuations of an-nual runoff in the United States are mapped. (Josefson-USGS) W74-01140

NEAR REAL TIME WATER RESOURCES DATA FOR RIVER BASIN MANAGEMENT, Geological Survey, Harrisburg, Pa. For primary bibliographic entry see Field 04A. W74-01150

STABILITY AND REACH LENGTH IN WATER SURFACE PROFILE DETERMINATION, Stanley Consultants, Inc., Muscatine, Iowa. Dept. of Engineering. G. F. Tavener.

Water Resources Bulletin, Vol 9, No 5, p 950-962, October 1973. 5 fig, 3 tab, 2 ref, 1 append.

Descriptors: *Profiles, *Flow prof. *Backwater, Flood plains, Floods, Hydraulics.

Basic step methods of backwater computation are extended to reaches of finite length. Accuracies of commonly accepted hydraulic loss equations under particular water surface profile conditions are compared. Simulation of energy lines within a reach by parabolic curves minimizes error provided orientation of the axis of the parabola is selected in accordance with prevailing hydraulic conditions. An index reach length beyond which single-step computation from end to end of the reach must be in error was developed. Reduction of this reach length by suitable factors tailored to hydraulic conditions yields a mathematically defined allowable reach length for backwater computation. When reach length does not exceed this allowable reach length, no significant error may be detected. Automatic insertion of synthetic cross sections interpolated between surveyed cross sections (when these are inadvertently spaced too far apart) enables computation to proceed. This device is error-free for prismatic channels but may introduce error for irregular natural channels. Results may be accepted provided the fall in the when this is exceeded, additional cross sections should be surveyed. (Knapp-USGS) W74-01152

THE SOVIET DARMS PROGRAM-TWENTY YEARS OF DEVELOPMENT, DEPLOYMENT,

AND DATA, National Science Foundation, Washington, D.C. Office of Polar Programs.
For primary bibliographic entry see Field 07C.
W74-01157

THE ARCTIC DATA BUOY, A SYSTEM FOR ENVIRONMENTAL MONITORING IN THE

Washington Univ., Seattle. Applied Physics Lab. For primary bibliographic entry see Field 07B. W74-01158

SINGLE-VELOCITY METHOD IN MEASURING DISCHARGE, DEDITION OF THE PROPERTY OF T

MARINE RESOURCES AND OCEAN SURVEYS. National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. For primary bibliographic entry see Field 07B. W74-01169

THE BREAKING OF WAVES ON A SLOPING

BEACH, Rolls-Royce Ltd., Derby (England). Advanced Research Group. A. Jeffrey.

Zeitschrift fur Angewandte Mathematik und Physik, Vol 15, No 7, p 97-106, March 1964. 5 fig,

Descriptors: *Coasts. *Beaches. *Waves (Water). Identifiers: Discontinuity equation.

Calculations were made of the non-linear onedimensional propagation o, a periodic wave train into water which is at rest above a uniformly slopinto water which is at rest above a uniformly sloping beach, and the condition for the breaking of the incident wave was determined. The method is also directly applicable to problems in which the beach has a nonuniform slope. The method involves a discussion of the behavior of the Lipschitz continuous solution in the vicinity of the wavefront and does not depend for its success on special properties of the equations involved. Numerical results are presented for a typical problem showing the variation of the critical time and distance as functions of wave amplitude, wave frequency and the slope of the beach. (Sinha-OEIS) W74-01176

Group 2E-Streamflow and Runoff

BEACH CHANGES ON THE OUTER BANKS OF NORTH CAROLINA.

Virginia Univ., Charlottesville. R. Dolan.

Annals of Association of American Geographers, Vol 56, No 4, p 699-711, December 1966. 5 fig, 9 tab, 24 ref. ONR Nonr-1575 (03).

Descriptors: *North Carolina, *Beaches, Surf, *Waves (Water), Sediments, *Topography, Water

Identifiers: *Bodie Island (NC), *Shoaling

Relationships between surf-zone processes and subaerial beach changes are considered as they occur on Bodie Island, North Carolina. The processes include: wave height, wave period, wave direction, and still-water level. Measure-ments of beach change include: beach thickness, width, and slope, as well as the size and sorting of the beach-face sediment. Analysis reveals that changes in these beach characteristics are predictable using only two of the process factors considered: wave height and stillwater level. Large waves with high water levels cause rapid reductions in beach thickness, width, and slope. Small waves with low water levels are associated with water wider, and steeper beaches. Sediment size and sorting show little association with the processes of beach configuration. (Sinha-OEIS) W74-01179

CURRENT VELOCITY: A LONGSHORE REVIEW OF THEORY AND DATA. Army Coastal Engineering Research Center, Washington, D.C. C. J. Galvin, Jr.

Reviews of Geophysics, Vol 5, No 3, p 287-304, August 1967. 7 fig, 3 tab, 24 ref.

Descriptors: *Coasts, Momentum equation, *Velocity, *Currents (Water), Energy equation, *Forecasting.
Identifiers: *Longshore currents, *Conservation

A proven prediction of longshore current velocity is not available, and reliable data on longshore currents are lacking over a significant range of possible flows. Theoretical studies have been based on over-simplified models, and empirical predictions have been hampered by lack of data. The empirically modified, momentum-flux theory now accepted as the best prediction is based on an untenable assumption and supported by inappropriate data. Regardless of their validity, however, all six of the testable equations agree fairly well with at least one of six sets of published data, and two agree with both of the better sets of data. These two equations may be used as empirical guides for velocity prediction in the absence of a proven theory. The best prospect for a generally valid velocity prediction appears to be an empiri-cal correlation based on reliable data. (Sinha-W74-01187

NOTE ON THE EQUATIONS OF LONG WAVES OVER AN UNEVEN BOTTOM,

National Engineering Science Co., Pasadena, Calif.

C. C. Mei, and B. Le Mehaute.

Journal of Geophysical Research, Vol 71, No 2, p 393-400, January 15, 1966. 10 ref. ONR Nonr 4177

Descriptors: *Shallow water, *Waves (Water), *Coasts, Continental shelf, Equations, *Topography.
Identifiers: *Shoaling, *Long waves

Equations for long waves in shallow water are derived systematically for an uneven bottom. With the basic assumption that the depth is small in comparison with a horizontal length scale, three regimes of approximation are presented according to the magnitude of the wave amplitude. (a) When the amplitude is of the same order of magnitude as the depth, the Airy equations are rederived as the first approximation. (b) When the amplitude is comparable to the cube of the depth, both lengths being nondimensionalized with respect to a common horizontal scale, two high-order nonlinear equations are obtained which include the classical cnoidal wave as a special solution for a horizontal bottom. These equations may be transformed to a set of first-order quasi-linear hyperbolic equations with the characteristic curves in the x-t plane directly related to the bottom profile. To facilitate numerical computations they are then written as differential equations along the characteristics. In plitudes the appropriate linearized equations are given. (Sinha-OEIS) W74-01189 74-01189

EFFECTS OF FRICTION AND SURFACE TIDE ANGLE OF INCIDENCE ON THE COASTAL GENERATION OF INTERNAL TIDES. Washington Univ., Seattle. Dept. of Oceanog-

raphy. J. G. Weigand, H. G. Farmer, S. J. Prinsenberg,

and M. Rattray, Jr.

Journal of Marine Research, Vol 27, No 2, p 241-259, May 15, 1969. 11 fig, 10 ref.

Descriptors: *Internal waves, *Boundary processes, *Friction, Mathematical models, *Waves (Water), Coasts, Tides. Identifiers: Surface waves.

For the generation of internal waves by long surface waves, the normal-mode equations and solutions that satisfy the boundary conditions in a twolayer system are found analytically. Frictional effects decrease the amplitude of an internal wave over the shelf, changing it from a standing wave to a wave that progresses coastward and decreases the interference on the amplitude of the offshore progressive wave traveling seaward. Model stu-dies, using a two-layer system of fresh water and saline water in a 9.9 m-long channel, gave favorable results relative to the theoretical results. (Sin-W74-01190

A NOTE ON EDGE WAVES IN A STRATIFIED

FLUID, Massachusetts Inst. of Tech., Cambridge. Dept. of Mathematics.

H. P. Greenspar

Studies in Applied Mathematics, Vol 49, No 4, p 381-388, December 1970. 2 fig. 6 ref. F44620-67-C-

Descriptors: *Stratification, *Beaches, *Waves (Water), Equations, Density. Identifiers: *Edge waves.

Ursell's solutions are generalized so that they apply to a stratified fluid in which the density increases exponentially with depth. Explicit solutions are given for edge waves on a sloping beach.
The lowest mode, Stoke's edge wave, is found to
be completely insensitive to the density field. Compared with the case of constant density, 'stratified' edge waves are found to exist in a much wider range of conditions. The higher modes show that previous restrictions on slope angle no longer apply. (Sinha-OEIS) W74-01194

BEACH FOUILIRRIUM AND SECOND-ORDER

WAVE THEORY,
Johns Hopkins Univ., Baltimore, Md. Dept. of
Mechanics and Materials Science. D. R. Wells

Journal of Geophysical Research, Vol 72, No 2, p 497-504, January 15, 1967. 3 fig, 16 ref, 2 append.

Descriptors: *Beaches, Equilibrium, *Waves (Water), *Sedimentation, *Coasts, *Sediment transport, Gravity waves.

The skewness of the probability distribution of the horizontal water velocity of second-order gravity waves is derived in order to investigate the stability of sand beaches. If the distribution is skewed toward the beach, sand may accumulate; whereas if it is skewed away from the beach, sand may be swept seaward. A neutral line is defined where the skewness is zero, and computation show that it cannot occur shoreward of the point where the depth-to-wavelength ratio is approximately 0.090. These results explain in a precise manner some observed beach equilibrium phenomena. (Sinha-W74-01201

LONG SURF,

Brown Univ., Providence, R.I. Div. of Applied Mathematics.

D. V. Ho, R. E. Meyer, and M. C. Shen. Technical Report No. 4, March 1963. 17 p, 3 fig, 3 plates, 10 ref. ONR Nonr 562 (07), 562 (34).

Descriptors: *Surf, Mathematics, *Waves (Water), *Beaches, *Coasts. Identifiers: Breakers, Swell, Long surf.

A digest of a mathematical investigation on surf due to long swell is offered to present the assumptions and conclusions in a form usable by the ex-perimental physicist. The results so far obtained are mainly qualitative, but quite detailed in some respects, and radically different from the results of earlier analyses. Some new observational material is also presented. It appears that a simple, non-linear model is capable of describing the essence of the whole phenomenon -- breaker forma-tion, breaker collapse, run-up and back-wash -- for a quite representative type of surf. (Sinha-OEIS) W74-01203

THE TRANSVERSE CIRCULATION NEAR A

Florida State Univ., Tallahassee. Dept. of Mathematics; and Florida State Univ., Tallahassee. Geophysical Fluid Dynamics Inst. S. L. Blumsack

Journal of Physical Oceanography, Vol 2, No 1, p 34-40, January 1972. 3 fig, 7 ref. NO0014-68-A-0159, NSF-GA-27560.

Descriptors: *Coasts, *Water circulation, *Boundary processes, Stratified flow, Rotational flow Identifiers: Length scale relationships, Transverse circulation.

The structure of the steady transverse circulation of a rotating stratified fluid on an f plane is analyzed in two stages. First, a length scale analysis is performed, giving the relationships between e vertical and horizontal length scales. Then an idealized problem in which there is an offshore Ekman transport near a coast is solved, giving the detailed structure of the transverse circulation. Boundary layer structures which decay algebraically are found from the formal solution. (Sinha-OFIS) W74-01206

EDGE WAVES OVER A SLOPING BEACH IN A ROTATING TWO-LAYERED SYSTEM, Florida State Univ., Tallahassee. Oceanographic

H. lida, and T. Ichiye. Prepared for Office of Naval Research. Technical Report No. 4, April 1963. 34 p, 5 fig, 2 tab, 13 ref, 1 append. ONR Nonr-988 (11).

Descriptors: *Beaches, *Slopes, Models, *Waves (Water), Currents (Water), *Shallow water, Sea level, Equations. Identifiers: Edge waves, Geostrophic currents.

Groundwater-Group 2F

A mathematical analysis of a model describing edge waves over a sloping beach in a rotating twolayered system is described. It is assumed that geostrophic currents in the upper and lower layers have uniform velocities owing to the surface elevation increasing linearly from the coast. Though such an infinite uprise of sea level seems unrealistic, the waves considered have amplitudes significant only near the coast and the simplified model is justified. Slopes of surface and the inter-face are assumed so small that the approximation of hydrostatic pressure is valid as shown by Eckhart (1951). (Sinha-OEIS)

EXPERIMENTAL STUDY OF WAVE REFLEC-TION BY A SLOPING BEACH, Tokyo Univ. (Japan). Ocean Research Inst.

K. Taira, and Y. Nagata. Journal of the Oceanographical Society of Japan, Vol 24, No 5, p 242-252, October 1968, 15 fig. 7 ref.

Descriptors: *Beaches, *Coasts, *Waves (Water), Gravity waves, Energy loss, Slopes.
Identifiers: *Wave reflection, Phase difference.

Wave reflection by a sloping beach was studied with small-scale gravity waves in a small wave-tank 4 m long. The breaking of small-scale waves is much different from that observed on natural ocean beaches or in experimental tanks using large-scale waves. In a small tank, the waves lose their energy by generating capillary waves several millimeters in length at wave fronts near the shoreline. However, the dependence of the reflec-tion coefficient on beach slope and on wave steep-ness are similar to those for large-scale waves, and the critical beach slope for wave breaking at a given deep wave steepness can be predicted by Miche's theory. The difference occurs only in the slope range just larger than the critical beach slope where the small-scale waves lose a significant amount of their energy without breaking. The capillary waves which are generated near the shoreline and propagate offshore seem to have an important role in this energy loss. The phase difference between the incident and reflected waves at the toe of the beach was also examined. The phase difference does not depend on wave steepness but depends on the ratio of wave length beach length. The experimental results show that the phase differnce is proportional to kL for a wide range of kL. For small values of kL, the experimental values agree with the calculated values based on a simple model. (Sinha-OEIS) W74-01223

AREAS OF POSSIBLE FLOODING IN KNOX

COUNTY, TENNESSEE, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C. W74-01269

FLOW VISUALIZATION IN FREE SHEAR

Hong Kong Univ. Dept. of Mechanical Engineering. For primary bibliographic entry see Field 08B. W74-01271

BOUNDARY CONTRACTIONS AS CONTROLS IN TWO-LAYER FLOWS, California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 08B.
W74-01276

LINEAR PROGRAMMING AND CHANNEL FLOW IDENTIFICATION, California Univ., Los Angeles. Dept. of Engineer-

For primary bibliographic entry see Field 08B. W74-01277

WAVE-INDUCED WATER PARTICLE MOTION MEASUREMENTS.

Naval Postgraduate School, Monterey, Calif. R. F. Krapohl.

Available from NTIS, Springfield, Va., 22151, AD-756 577 Price \$3.00 printed copy; \$1.45 microfiche. M Sc Thesis, December 1972. 61 p, 6 fig, 4 tab, 19 ref.

Descriptors: *Waves (Water), *Ocean waves, *Model studies, *Movement, Flow rates, Depth, Velocity, Flow measurement, Current meters, Winds, Equations.

Identifiers: *Water particle motion, Wave-induced water, Wave spectra.

During June 8, 1972 records of orthogonal water particle velocity and instantaneous water elevation were measured at the Naval Undersea Research and Development Center (NUC) tower located approximately 1 mile off Mission Beach, California. Simultaneous measurements of wave height and two orthogonal water particle velocities were made at six elevations in 19 meters of water using a penetrating wave staff and an electromagnetic flowmeter. Moderate swell and low wind conditions prevailed during the experiment. The measured wave-induced velocities were 2%-4% greater than those predicted using linear wave theory. Coherence of the wave height and waveinduced velocities in the significant energy-density range was computed to be over 0.85, indicating that the motion was almost totally wave induced. At higher frequencies it was apparent that the mo-tion was primarily turbulence. Phase spectra com-puted for the measured wave heights and orbital velocities compared very well with linear theory. Measured frequency distributions were compared to both Gaussian and Gram-Charlier distributions using the chi-squared goodness-of-fit test. Qualitatively, the Gram-Charlier distribution gave the better fit to the data. (Woodard-USGS)

ROTAMETER.

For primary bibliographic entry see Field 07B. W74-01500

THERMAL STRATIFICATION IN INDUSTRIAL CANALS, Louisiana State Univ., Baton Rouge.

A. M. Kamel. Water Resour Bull. Vol 8, No 5, p 1018-1030, 1972, Illus.

Identifiers: *Canals, Industrial canals, *Thermal stratification, *Thermal diffusion equation, Temperature patterns.

A case study for the application of the thermal dif-fusion equation for the prediction of the temperapresented.—Copyright 1973, Biological Abstracts, Inc.

W74-01594

HYDROGRAPH SIMULATION MODELS OF THE HILLSBOROUGH AND ALAFIA RIVERS, FLORIDA: A PRELIMINARY REPORT,

Geological Survey. For primary bibliographic entry see Field 04A. W74-01611

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT. VOLUME 2. HYDROLOGIC DATA MANAGE-

Corps of Engineers, Davis, Calif. Hydrologic Engineering Center. L. R. Beard.

Available from NTIS, Springfield, Va 22151 as AD-758 905 Price \$3.00 printed copy; \$1.45 microfiche. Report HEC-IHD-200, April 1972. 213 p, 11 fig, 6 tab, 12 ref.

Descriptors: *Water resources development, *Hydrologic data, *Data processing, *Computer programs, *Streamflow, Stochastic processes, Correlation analysis, Methodology, Runoff, International Hydrological Decade, Hydraulic engineering, Data storage and retrieval, Regional

This volume (vol 2) is part of a 12-volume report entitled, 'Hydrologic Engineering Methods for Water Resources Development,' prepared as part of the U.S. Army Corps of Engineers' participa-tion in the International Hydrological Decade. Volume 2 describes methods and procedures for managing hydrologic data in a systematic manner, techniques for estimating missing portions of hydrologic records, and techniques for generating synthetic hydrologic data. A generalized computer program description, 'Monthly Streamflow Simulation,' is included. This program will analyze monthly hydrologic data at a number of interrelated stations, generate sequences of hypothetical hydrologic data, and reconstitute missing hydrologic data on the basis of concurrent data observed at other locations. (Woodard-USGS) W74-01642

LONGSHORE CURRENT GENERATION BY OBLIQUELY INCIDENT INTERNAL WAVES, Massachusetts Inst. of Tech., Cambridge.

N. G. Hogg.

Geophysical Fluid Dynamics, Vol 2, No 4, p 361-376, September 1971. 2 fig, 5 ref. Nonr 1841 (74) and Nonr 3963 (31).

Descriptors: *Internal waves, Shores, *Beaches, *Waves (Water), *Coasts, *Shallow water. Identifiers: *Breaker zone, Vertical eddy motions, Longshore currents, Viscous stresses, *Internal

A significant longshore current of maximum amplitude $v \pm (30,000/v)$ cm/sec-1 (for typical oceanic values) can be forced between the breaker zone and shore by internal gravity waves obliquely incident on a plane beach. In the mean longshore momentum balance Reynolds stress terms appear which can be calculated to O (alpha), alpha being a which can be cardinated to Gaphay, apina being a bottom slope parameter, using a WKB approach. With appropriate assumptions being made about the amplitude behavior of the motion after breaking, the divergence of these stresses does not vanish and forces a current whose magnitude is determined by a balance with viscous stresses derived from vertical eddy motions. (Sinha -W74-01650

2F. Groundwater

PREDICTION OF WELL DEVELOPMENT POS-SIBILITIES IN DELAWARE BY MEANS OF CALIBRATED GAMMA-RAY LOGS, Delaware Geological Survey, Newark.
For primary bibliographic entry see Field 04B. W74-01106

CALCULATION OF PERMEABILITY OF CRETACEOUS SANDSTONES FROM PUMPING AND STATIC LEVEL DATA IN SELECTED AREAS OF WESTERN SOUTH DAKOTA, South Dakota School of Mines and Technology, Rapid City. Dept. of Geology and Geological En-

gineering. P. H. Rahn, and J. P. Gries.

Available from the National Technical Information Service as PB-225 128/8, \$2.75 in paper copy, \$1.45 in microfiche. South Dakota State University, Brookings. Water Resources Institute Comp tion Report, July 1973. 15 p. 9 fig, 11 ref. OWRR A-034-SDAK (1). 14-31-0001-3842.

Group 2F-Groundwater

Descriptors: *Permeability, Aquifer characteristics, *Aquifer testing, Wells, *South Dakota, Sandstones, Theis equation, Pumping. Identifiers: Dakota Formation (SDak), Lakota Formation (SDak), *Cretaceous sandstones.

A pump test was conducted in the Dakota Sandstone at Wall, South Dakota, on October 7, 1972. Two observation wells responded to the pumping, and an average value of permeability was calculated to be 9.42 gpd/sq ft. No deviation from the Theis type curve was observed during the 44 hours of pumping at 120 gpm. A pump test was conducted on a new well at Box Elder, South Dakota, on July 6, 1972. The well was pumped at 110 gpm for 54 hours and the recovery was documented. The resulting calculation of permeability is 7.06 gpd/sq ft. (Wiersma-South Dakota) W74-01113

DETERMINATION OF THE TOTAL STORAGE CAPACITY OF THE CRETACEOUS SAND-STONE AQUIFERS IN SOUTH DAKOTA,

South Dakota School of Mines and Technology, Rapid City. Dept. of Geology and Geological En-

gineering.
J. P. Gries, W. J. Sick, and R. K. Baker.

Available from the National Technical Information Service as PB-225 122/1, \$2.75 in paper copy, \$1.45 in microfiche. South Dakota State University, Brookings, Water Resources Institute Completion Report, June 1973. 13 p, 6 fig, 17 ref. OWRR A-031-SDAK (1). 14-31-0001-3842.

Descriptors: *Porosity, *Water storage, *Sand-stones, Aquifer characteristics, *South Dakota, Wells, Stratigraphy.

Identifiers: Dakota Formation (SDak), Fall River Formation (SDak), Lakota Formation (SDak), Newcastle Formation (SDak).

Sandstones were divided into three stratigraphic units; where Skull Creek Shale separates the Lakota and Fall River Formations from the overlying Newcastle-Dakota Formations formed two units, the third is east of the Skull Creek Shale pinchout where the formations merge into the Dakota Formation. Thicknesses of effective sandstone within each unit were determined from resistivity and spontaneous potential logs. Data from about 380 wells were used. An isopach map of effective sandstone thickness was prepared for each unit. Porosities of the effective sand units west of the Skull Creek zero line were determined from sonic and bulk density logs. Isoporosity maps were prepared using data from about 150 wells. By superimposing effective sand and porosity maps, a total volume of porosity figure was calculated. A total of 1.3 billion acre-feet of water storage capacity was determined for the Fall River-Lakota interval, and 977,800 acre-feet for the Newcastle-Dakota sandstones. East of the Skull Creek zero line, no sonic or bulk density logs were available. A porosity value of 25 percent was applied to the total thickness of effective sandstones, giving an estimated storage capacity of 360 million acre-feet for the sandstones of the Dakota Formation. (Wiersma-South Dakota) W74-01114

RESERVOIR MECHANISM IN AN AQUIFER OF ARBITRARY BOUNDARY SHAPE, Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering. J. Eliasson, S. St. Arnalds, S. Johannsson, and S.

Nordic Hydrology, Vol 4, No 3, p 129-146, 1973. 10 fig. 1 tab. 4 ref.

Descriptors: *Groundwater movement, *Unsteady flow, *Mathematical models, Numerical steady flow, "mathematical models, Numerical analysis, Hydrogeology, Aquifer characteristics, Surface-groundwater relationships.

Identifiers: *Iceland.

Unsteady groundwater flow in an aquifer of limited horizontal extent and arbitrary boundary shape is described by a differential equation, the solution of which includes the solution of an eigenvalue problem by a numerical method. Boundary conditions are provided by nature in the form of watertight rocks, rivers, lakes or any kind of constant water level in hydraulic contact with the aquifer. The runoff behaves as a sum of flows through infinitely many linear reservoirs, corresponding to the eigen functions. The resulting equations for groundwater level and runoff discharge are sums of convolution integrals of the infiltration, an easy process to handle in a digital computer. The mathematical model derived was used to analyze the inflow into a water reservoir in Iceland from a nearby lava field. (Knapp-USGS)

BALANCE ESTIMATE OF GROUNDWATER RESOURCES ON THE NORTHWESTERN SLOPE OF THE CAUCASUS (BALANSOVAYA OTSENKA RESURSOV PODZEMNYKH VOD SEVERO-ZAPADNOGO SKLONA BOL'SHOGO KAVKAZA),
For primary bibliographic entry see Field 04B.

W74-01136

REGIONAL ESTIMATE OF BRACKISH- AND SALINE-GROUNDWATER YIELD GIONAL'NAYA OTSENKA EKSPLUATATSION-NYKH RESURSOV SOLONOVATYKH SOLENYKH PODZEMNYKH VOD), Akademiya Nauk SSSR, Moscow. Institut Vod-

nykh Problem For primary bibliographic entry see Field 04B. W74-01137

PROBLEMS IN REGIONAL DYNAMICS OF AR-TESIAN WATER (PROBLEMY REGIONAL'-NOY DINAMIKI ARTEZIANSKIKH VOD), M. R. Nikitin.

Vodnyye Resursy, No 2, p 199-202, 1973, 5 ref.

Descriptors: *Conferences, *Confined water, *Artesian aquifers, Artesian heads, Pressure, Pressure head, Hydrodynamics, Groundwater move-

Identifiers: *USSR, Artesian basins, Tectonics.

An interdepartmental All-Union conference devoted to regional dynamics of artesian water and hydrodynamics of deep zones of artesian basins was held in Leningrad November 28-December 1, 1972. Conference participants in-cluded more than 350 delegates from approximately 60 scientific institutes, industrial organizations, and educational establishments. Twenty of the 116 papers of the conference were presented at two plenary sessions and the remaining papers were presented at sectional meetings. Among the topics discussed were: regional dynamics of artesian basins in ancient and recent platforms and foldedmountain regions; relation between vertical and lateral movement of groundwater; role of tectonic factors; origin of anomalously high and low groundwater pressure heads; contribution of folded-mountain structures to the alimentation of deep artesian horizons; and new proposals for the classification of artesian basins. (Josefson-USGS)

HYDROGEOLOGIC CHARACTERISTICS OF THE VALLEY-FILL AQUIFER IN THE WEL-DONA REACH OF THE SOUTH PLATTE RIVER VALLEY, COLORADO, Geological Survey, Lakewood, Colo. Water Resources Div. For primary bibliographic entry see Field 04B.

W74-01142

GROUND-WATER YIELD POTENTIAL IN KNOX COUNTY, TENNESSEE, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C.

SENSITIVITY OF GROUNDWATER FLOW MODELS TO VERTICAL VARIABILITY OF AQUIFER CONSTANTS, Oklahoma State Univ., Stillwater. Dept. of Civil Engineering. For primary bibliographic entry see Field 04B.

DRAWDOWN AT TIME-DEPENDENT FLOWRATE, Wisconsin Univ., Milwaukee. Coll. of Applied Science and Engineering. R. Y. Lai, G. M. Karadi, and R. A. Williams. Water Resources Bulletin, Vol 9, No 5, p 892-900, October 1973, 3 fig. 7 ref.

Descriptors: *Drawdown, *Groundwater movement, Withdrawal, Acquifers, Water yield, Water level fluctuations, Equations, Discharge (Water), Unsteady flow, Artesian aquifers, Artesian wells.

The exact solution for the drawdown in and around a well in a homogeneous, isotropic, and confined aquifer is presented for well discharge as a function of time. The effect of the storage capacity of the well is also taken into consideration. Two types of flow rate functions are studied, namely linear and exponential functions, and the results are plotted in graphs. A nonflowing well of finite diameter in a homogeneous, isotropic con-fined aquifer of uniform thickness is considered under the assumption that the well screen penetrates the entire artesian aquifer. (Knapp-USGS) W74-01155

RESOURCES, GEOLOGICAL STRUCTURE AND LANDFORM SURVEYS, National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. For primary bibliographic entry see Field 07C. W74-01166

A DISTRIBUTED HYDROLOGICAL MODEL BASED ON THE CONCEPT OF GROUND-WATER RECHARGE, TRANSMISSION, AND

Department of the Environment, Ottawa (Ontario). Inland Waters Branch.

J Hydrol (Dunedin). Vol 10, No 2, p 133-140. 1971. Identifiers: Discharge, Equations, *Groundwater

recharge, *Hydrological models, Model studies, Moisture zone, Recharge, Soils, Transmission, Groundwater movement.

conceptual model is proposed which is distributed on the basis of groundwater flow systems. The fundamental unit of the model is a vertical section in which 4 groundwater regions are distinguished: a recharge region, a transmission region, a discharge region and a bank storage region. Each region is subdivided into a groundwater zone and a soil moisture zone. The storage and transmission equations are formulated, and a procedure is out-lined for routing precipitation through the model.--Copyright 1973, Biological Abstracts, Inc. W74-01233

AREAS WITH ABUNDANT SINKHOLES IN KNOX COUNTY, TENNESSEE, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C.

Water in Soils—Group 2G

GEOTHERMAL RESOURCE INVESTIGA-

Bureau of Reclamation, Boulder City, Nev. Re-For primary bibliographic entry see Field 04B.

W74-01273

NUMERICAL SOLUTION OF MULTIPHASE WELL FLOW, New Mexico Inst. of Mining and Technology,

Socorro. Dept. of Ground-Water Hydrology. For primary bibliographic entry see Field 08B. W74-01275

CONTRIBUTION TO PHYSICOCHEMICAL STUDY OF SOME SPRINGS OF THE GAPEAU RIVER BASIN (VAR), For primary bibliographic entry see Field 02K. W74-01288

STORAGE AND RETRIEVAL OF GROUND-

WATER DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch. For primary bibliographic entry see Field 07C. W74-01291

RECOGNITION OF NATURAL BRINE BY ELECTRICAL SOUNDINGS NEAR THE SALT FORK OF THE BRAZOS RIVER, KENT AND STONEWALL COUNTIES, TEXAS,

STONEWALL COUNTIES, TEXAS, Geological Survey, Washington, D.C. A. A. R. Zohdy, and D. B. Jackson. Available from GPO, Washington, D C 20402, Price 40 cents postpaid or 30 cents GPO Book-store. Professional Paper 809-A, 1973. 14 p, 13 fig,

Descriptors: *Saline water-freshwater interfaces, *Subsurface waters, *Texas, Analytical techniques, Electrical resistance, Sounding, Depth, Sound waves, Hydrogeology data collections, Instrumentation, Geology, Groundwater

movement.
Identifiers: *Kent County (Tex), *Stonewall County (Tex), Electrical sounding, Salt springs, Seeps.

Fifteen electrical soundings were made near the Salt Fork of the Brazos River in Texas using the Schlumberger and equatorial electrode arrays to evaluate the usefulness of the direct-current resistivity method in determining the depth of a freshwater-saltwater interface in a geologic setting containing gypsum and anhydrite layers. The sounding data were interpreted by curve matching and computer modeling, and indicate that the re-sistivity method is useful where the interface lies above the gypsum series and also where the effec-tive relative conductance of the brine-saturated layers below the gypsum layers is large. This type of successful application was obtained from soundings made near the town of Jayton and also in an area approximately 7 miles west of Asper-mont. Near the town of Girard, the freshwatersaltwater interface was difficult to detect because of the presence of high-resistivity anhydrite beds that lie directly beneath the interface. In the immediate vicinity of Aspermont and north of Old Glory, preliminary interpretation of the sounding data indicates the presence of brackish- to fresh-water-saturated sedimentary rocks. (Woodard-USGS) W74-01370

STUDY OF THE SPEED OF WATER CIRCULA-TION IN A WATER-BEARING LIMESTONE DEPOSIT BY TRACING TESTS (LA SERRIERE

Hydrogeologie.

B. Mathey, and G. Simeoni.

Bull Soc Neuchatel Sci Nat. 95. p 173-180, 1972, Illus, English summary.

Identifiers: *Circulation, *Limestone deposits, River basins, *Switzerland (La Serriere River basin), *Tracing tests.

Repetition of a coloring test clearly shows the influence of the hydrological state of the nappe upon the filtration rate of water. Fissuration and hydraulic gradient determine the circulation rate of water.--Copyright 1973, Biological Abstracts, Inc. W74-01563

UNDERGROUND STORAGE OF TEXAS PLAYA LAKE WATERS BY INJECTION INTO THE OGALLALA FORMATION UNDER MODERATE PUMP PRESSURE. Texas Tech Univ., Lubbock.

For primary bibliographic entry see Field 04B. W74-01627

2G. Water in Soils

TRANSIENT MOVEMENT OF WATER AND SOLUTES IN UNSATURATED SOIL SYSTEMS, Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.

A. K. Tyagi, D. D. Evans, H. K. Qashu, and A. W. Warrick

Available from the National Technical Information as PB-225 119/7, \$3.00 in paper copy, \$1.45 in microfiche. Project Completion Report, September 1973. 31 p, 15 fig, 2 tab, 3 ref. OWRR B-020-ARIZ (4). 14-31-0001-3555.

Descriptors: *Soil water movement, *Finite element analysis, *Solutes, *Salts, Dispersion, *Soil moisture, Simulation analysis, Infiltration,

Identifiers: *Unsaturated soil.

The movement of moisture content and dispersion of salts in unsaturated groundwater systems were studied. The subject was studied as both a hydrologic phenomenon and as a dispersion phenomenon caused by the quantity and the rate of application of water, together with solutes. From theoretical considerations, equations were derived to predict the moisture contents and the concentrations as a function of time and space. Finite element solutions were obtained for a composite system of moisture content and water quality. The generalized programs are capable of simulating and predicting the transport and distribution of solutes in water, under a variety of boundary conditions in the field and laboratory. In order to verify the simulation process of the developed nu-merical models, laboratory experiments were conducted. Natural soils, coarse sand, and fine sand were used as porous media in the column experiments. In the column, ten stations at 10-centimeter depth intervals were fixed for observation of moisture content, suction head, and concentration of solute in the water. Ten experiments for the infiltration and drainage conditions were performed. The observed data on moisture content and concentration for one-dimensional cases are in agreement with the finite element solutions. W74-01104

STRATIGRAPHY AND ECONOMIC GEOLOGY OF THE COASTAL PLAIN OF THE CENTRAL SAVANNAH RIVER AREA, GEORGIA, Georgia Univ., Athens. Dept. of Geology. For primary bibliographic entry see Field 02J. W74-01122

SOIL ASSOCIATION MAP OF KNOX COUNTY. TENNESSEE. Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C.

PHYSICAL PROPERTIES OF SOME VOL-CANIC-ASH DERIVED SOILS OF THE HIGHLANDS OF PASTO, NARINO, COLOM-

Narino Univ., Pasto (Colombia). Facultad de Ciencias Agriculturas.

G. Escovar, R. Jurado, and Ricardo Guerreo R. Turrialba. Vol 22, No 3, p 338-346. 1972. Illus. (English summary).

Identifiers: *Colombia (Pasto Highlands), Density, Highlands, Index, Plasticity, Porosity, Soils, Stability, Texture, *Volcanic ash, *Soil physical

Determinations were made on texture, densities, porosity, plasticity, water stability of aggregates and humidity retention capacity (humidity critical points). The soils presented dominance of sand and silt over clay. Porosity and retention capacity of humidity were very low and apparent density very high in comparison with those obtained from volcanic soils of Latin America, USA and Japan. Their plasticity index was relatively low and their ner plasticity mack was relatively low and the aggregation ratio very high. Apparently, the soils from the Altiplano of Pasto have not reached the development of the typical 'andosol.' Studies of statistical correlation indicated that organic matter markedly influences most of the physical properties studied. It increased porosity, aggregation and humidity retention capacity and it decreased plasticity.—Copyright 1973, Biological Abstracts, Inc. W74-01228

EFFECT OF PUDDLING ON PHYSICAL PRO-

PERTIES OF RICE SOIL,
Fertilizer Corp. of India, Sindri. Planning and
Development Div. For primary bibliographic entry see Field 03F. W74-01246

EFFECT OF THE QUALITY OF WELL WATERS ON SOILS IN GURGAON DISTRICT, Haryana Agricultural Univ., Hisser (India). Dept.

H. R. Manchanda, and J. S. Kanwar. Haryana Agric Univ J Res. Vol 1, No 2, p 1-10,

Identifiers: Adsorption, *Electrical conductivity, *India (Gurgaon district), Irrigation, Sodium, Soils, *Well water, Water quality, *Soil chemical properties.

Palwal and Bawal, Na percentage and Na/Ca + Mg ratio increased with soil depth in soils irrigated by the B-category (bad) waters, whereas, the reverse was true in soils receiving the A-category (good) waters. The electrical conductivity was maximum at 0-15 cm and minimum at 15-30 cm soil depth, irrespective of the quality of irrigation water. The A-category waters of Gurgaon and Nuh had about 2 times more electrical conductivity (EC) than the B-category waters, but their con tinuous use did not increase the salt content of the soil. The A-category waters of these soils were the best for irrigation purposes, because of high NO3 and K content particularly for the light textured soils. Significant correlations were obtained between the EC and Na adsorption ratio (SAR) of irrigation waters and the soils irrigated. SAR of water was also significantly associated with the exchangeable Na percentage (ESP), SUG-GESTED THAT THE EC and SAR of irrigation water were good indices for predicting salt and Na accumulation in soil.—Copyright 1973, Biological Abstracts, Inc. W74-01252

SOIL AERATION RESPONSE TO DRAINING INTENSITY IN BASIN PEAT,

Northern Forest Research Center, Edmonton (Alberta).

Forestry (Oxf). Vol 45, No 2, p 135-143. 1972, Il-

Group 2G-Water in Soils

Identifiers: *Aeration, Draining, Forestation, *Oxygen diffusion, Peat, Pinus-Contorta-Var-Latifolia, Polarography, *Scotland (Flanders Latifolia, Polarogra Moss), *Soil aeration.

Improvement in soil aeration was assessed following draining to a range of intensity on a peatland afforestation project at Flanders Moss in Central Scotland. A polarographic technique was used to measure O2 diffusion rates in the rooting zine of lodgepole pine (Pinus contorta Dougl. var. latifolia Engelm.) planted in 1965 on plowed furrows. There were soil aeration differences because of draining intensity. Below the planting turf O2 diffusion rates rapidly decreased and tree rooting was restricted to the surface layers. Aeration was found to be closely correlated with depth of water in boreholes which provide a simple and reliable index of response to draining. O2 diffusion rate was a more sensitive means of assessing soil aeration than oxidation-reduction potential at the low O2 concentrations encountered in the basin peat on the Moss .-- Copyright 1973, Biological Abstracts. Inc. W74-01255

MICRODETERMINATION OF CHLORO-S-TRIAZINES IN SOIL BY GAS-LIQUID CHRO-MATOGRAPHY WITH NICKEL ELECTRON CAPTURE OR ELECTROLYTIC CONDUCTIVI-TY DETECTION,

Hawaii Univ., Honolulu. For primary bibliographic entry see Field 05A. W74-01304

PHYSICAL EDAPHOLOGY, THE PHYSICS OF IRRIGATED AND NONIRRIGATED SOILS,

W. H. Freeman and Co.: San Francisco, Calif., 1972. (Revised and edited by G. L. Ashcroft). 533

The interactions of soil physical processes and conditions with the atmospheric environment and the growing plant are discussed. Subjects include the foundations of irrigation science, climatic factors and evapotranspiration, the physical proper-ties of water, the colloidal system, the soil solids, energy relations of soil water, water movement, measurement, retention and flow in field soil. Soil structure, aeration and temperature and irrigation are discussed. Appendixes containing dimensions and units for physical quantities, conversion factors and values for selected physical constants are included .-- Copyright 1973, Biological Abstracts, Inc. W74-01572

A RELIABLE AND INEXPENSIVE SOIL FROST

Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management.

B. O. Wilen, W. P. MacConnell, and L. F.

Michelson

Agron J, Vol 64, No 6, p 840-841, 1972. Identifiers: Electrical resistance, *Frost, *Gages, Gypsum, Resistance, *Soil frost gages, Instrumen-

The fabricated gypsum electrical resistance blocks proved their reliability as soil frost measuring devices. The difference in the electrical resistance between frozen and unfrozen soil is great enough to give a reliable indication of whether or not the soil is frozen. The blocks measure the physical state of the soil water inside them, independent of the temperature of the soil water in the blocks. The blocks will measure subsurface frost when the surface soil is unfrrozen. Since the blocks are small. they respond quickly to freezing and thawing of a relatively limited test area. The fabricated gypsum electrical resistance blocks should be of great value in frost measurement because the units are inexpensive, easy to construct, and last at least 2 yr in field use .-- Copyright 1973, Biological Abstracts. Inc. W74-01574

EFFECT OF PORTLAND CEMENT ON SOIL AGGREGATION AND HYDRAULIC PROPER-

Purdue Univ., Lafayette, Ind. Agricultural Experiment Station. L. R. Ahuja, and D. Swartzendruber.

Soil Sci, Vol 114, No 5, p 359-366, 1972, Illus. Identifiers: *Cement (Portland), Diffusivity, *Hydraulic properties, *Soil aggregation, Water.

The effect of addition of small quantities of portland cement on the water-stable aggregates, the saturated hydraulic conductivity, the soil-water characteristic, and the unsaturated soil-water diffusivity of a silt loam soil are evaluated. Cement was intimately mixed with air-dry soil at a rate of 0.475%, 0.95% or 1.90% by weight, and the mixture was kept in moist condition for 32 hr, 7 days, 14 days or 28 days. The aggregate indicated a beneficial effect of cement application increasing with the rate and the duration of moist-curing. The amount of water-stable aggregates in the cementtreated soil increased as much as 3-fold, and the aggregation index increased as much as 8-fold, as compared with the moist-cured no-cement control. Most of the beneficial effect was achieved with 1% cement and 14 days duration of moist-curing. The saturated hydraulic conductivity of the treated samples was not much different from that of the control initially, but as the water flow continued for 12 hr the conductivity of the control decreased to 1/2 its initial value while the conductivities of the treated samples slightly increased. The water-retention curve measured for the soil treated with 1.90% cement showed a small decrease in the water retained between 50 cm and 200 cm suctions. The unsaturated soil-water diffusivity of the treated sample was practically the same as that of the control .-- Copyright 1973, Biological Abstracts, Inc. W74-01576

NITRATE REDUCTION IN SOILS: EFFECT OF SOIL MOISTURE TENSION, Louisiana State Univ., Baton Rouge.

L. Pilot, and W. H. Patrick, Jr. Soil Sci. Vol 114, No 4, p 312-316. 1972. Illus. Identifiers: Moisture, *Nitrate reduction, Potential, Redox, Reduction, *Soil moisture tension, Soils, *Mississippi, *Soil aeration.

Nitrate reduction was very marked in the low moisture tension range for the 3 Mississippi River, alluvial soils studied, especially during the first 36-48 hrs of incubation. Critical moisture tension values specific to each soil were observed at which a small decrease in moisture tension caused a sharp increase in the rate of nitrate reduction. At tensions above these critical values (about 20 cm for the Crevasse soil and between 30 and 40 cm for both the Commerce and Mhoon soils) no nitrate loss occurred. The effect of moisture tension was in governing the air-filled porosity of the soil which in turn regulated the aeration of the soil. The critical values of air-filled porosity were 11% in the Crevasse soil, 12% in the Commerce soil and 14% in the Mhoon soil. Air-filled porosities this high and higher allowed oxygen to diffuse completely through the soil cores, kept the redox potential at high values and prevented nitrate loss. A very small amount of oxygen completely penetrating the soil core was sufficient to prevent dentrification. There was no evidence of nitrates being reduced under aerobic conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-01583 DESORPTION AND DISSOLUTION OF SALTS FROM SOILS AS A FUNCTION OF SOIL WATER RATIO,

Goettingen Univ. (West Germany). Inst. of Soil Science and Food Nutrition.
B. Ulrich, and P. K. Khanna

Soil Sci. Vol 114, No 4, p 250-253. 1972. Illus. Identifiers: Desorption, Dissolution, *Salts, *Soil water ratio, Soils, *Cation concentration (Soil), Adsorption.

In 4 soils of low C content and different pH, the concentrations of the different cations in the soil solution were determined at solution volumes of 0.27-20 ml/g after equilibrating for 24 hr. Up to solution volumes of 0.6-0.8 ml/g soil, the cation concentration in the soil solution is determined by salt desorption; at higher solution volumes dissolution processes are governing. The salt adsorption in the 4 soils amounts to around 2 micro eq/g clay plus silt. The lower the intensity of the exchangeable binding of a cation, the greater is its fraction, which is present not in exchangeable but in adsorbed form. Due to the existence of adsorbed salt in soils, exchangeable cation determination bears a systematic error. Equilibrium soil solution should be taken only from samples with solution volumes less than 0.6-0.8 ml/g soil.--Copyright 1973, Biological Abstracts, Inc. W74-01604

SYSTEM OF TREATING IRRIGATED SOIL WHICH IS SOWN WITH SUGAR BEETS, (IN RUSSIAN),

For primary bibliographic entry see Field 03F. W74-01606

SOIL AND WATER CONSERVATION ON ARA-BLE LANDS,

Soils Inst., Tehran (Iran). Soil and Water Conservation Div.

For primary bibliographic entry see Field 03F. W74-01633

DISTRIBUTION PATTERNS AND POPULA-TION DYANMICS OF THE MICRO--ARTHROPODS OF A DESERT SOIL IN SOUTHERN CALIFORNIA,

Westfield Coll., London (England). Dept of Zoolo-

For primary bibliographic entry see Field 02I. W74-01635

STUDY OF SOIL PLASTICITY OVER A WIDE RANGE OF SOIL MOISTURE CONTENTS, Azove-Chernomorskii Selskokhozyaistvennyi In-

stitut, Rostove-na-Donu (USSR). M. B. Minkin, A. G. Kalmykov, and N. I. Buraychuk.

Soviet Soil Science, Vol 4, No 5, p 600-604, 1972. 1 fig, 1 tab, 11 ref. Translated Pochvovedeniye, No 10, p 121-125, 1972.

Descriptors: *Soil mechanics, *Soil water, *Plasticity index, *Soil properties, *Soil moisture, Model studies, Plasticity, Moisture content.

Plasticity is usually understood to mean the capacity of a system to deform without rupture if the shear stress exceeds the ultimate shear stress and retains the new shape when the load is removed. The difference in water content between the upper and lower plastic limits (1.e. the plastic number) is extremely important for developing scientific methods of working the soil and for describing the mechanical properties of soils. The soil plasticity index developed by Volarovich was studied over a wide range of moisture contents. This index (ratio of ultimate shear stress to plastic viscosity) is a very objective method which can describe the plastic properties of a system, not only at separate boundary points, but over the en-tire range of soil moisture content variations. It was discovered that the plastic number, which has a strictly physical basis, most accurately reflects the structural mechanical properties of soils at the plastic limits. Solonetz soils, typically halomorphic in character, and found in arid regions, are included in the sampling. (Black-Arizona) 74-01636

2H. Lakes

THE DISTRIBUTION, COMPOSITION AND BIOMASS OF THE CRUSTACEAN ZOOPLANK-TON POPULATION IN WESTERN LAKE SU-

Wright State Univ., Dayton, Ohio. Dept. of Biological Sciences.

For primary bibliographic entry see Field 05C.

COASTAL PROCESSES AND BEACH DYNAM-ICS AT SHEBOYGAN, WISCONSIN, JULY, 1972.

Williams Coll., Williamstown, Mass.

Williams Coll., Williams with, Mass. W. T. Fox, and R. A. Davis, Jr. Available from NTIS, Springfield, Va., 22151 as AD-760 348 Price \$3.00 printed copy; \$1.45 microfiche. Technical Report No 10, April 3, (1973). 94 p, 35 fig, 23 ref, 3 append. ONR-GP Contract N00014-69-C-0151.

Descriptors: *Stroms, *Weather patterns, *Great Lakes, Data collections, Model studies, Winds, Waves (Water), Fog, Shores, Currents (Water), Upwelling, *Lake Michigan, Weather forecasting, Meteorological data, *Wisconsin.

During July 1972, a field study was conducted near Sheboygan, Wisconsin on the western shore of Lake Michigan to contrast coastal processes when storms move offshore with those encountered when storms move onshore on the eastern side of the lake. During the summer, the storms generally follow a path from west to east across the Great Lakes. Southwest winds build up the highest waves and strongest longshore currents on the east side of the lake. Winds from the south, blowing along the western shore, result in upwelling of cold water on the western side of the lake. The seabreeze effect is much stronger and fog more common along the western shore. The study area had a sinuous shoreline with a wavelength of 1000 feet and an amplitude of 30 feet. Crescent-shaped bars enclosing troughs approached the shore at the horns of the crescent. During high wave energy, the bars migrated within the study area, but the same general nearshore pattern was maintained. A computer simulation model was developed for the eastern shore of Lake Michigan which will be tested and modified for the western shore. (Woodard-USGS) W74-01130

CHEMICAL RELATIONSHIPS BETWEEN SUR-FACE WATER AND THE GROUND IN SOUTH

Miami Univ., Coral Gables, Fla. For primary bibliographic entry see Field 02K. W74-01153

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES.
National Oceanic and Atmospheric Administra-

tion, Rockville, Md.

International Field Year for the Great Lakes Bulletin No 7, July 1973. 91 p, 13 fig, 8 tab.

Descriptors: *Hydrologic data, *Great Lakes, *In-ternational waters, *Canada, *United States, In-ternational Hydrological Decade, Surface waters, Erosion, Groundwater, Meteorological data, Climatology, Water temperature, Remote sensing, Aerial photography, Weather patterns, Winds, Humidity, Bathymetry, Aircraft, Ships, Data col-lections, Methodology, Instrumentation.

This bulletin summarizes data collected by Canada and the United States as part of the International Field Year For The Great Lakes (IFYGL) program. The data submitted by Canada are: groundwater erosion along part of the north shore of Lake Ontario (IFYGL Project 38 TW); analysis of energy fluxes by aerodynamic methods (IFYGL Project 44 BL); meteorological buoy measure-ments (IFYGL Project 97 BL); determination of temperature and current climatology relevant to cooling water intake locations for the proposed Ontario Hydrogenerating Stations (IFYGL Project 110 WM); A.R.T. surveys of Lake Ontario summary of flight operations (IFYGL Project 16 ME); bathymetric survey of Lake Ontario and position-ing system evaluation (IFYGL Project 79 F); and wind temperature and humidity fluctuations (Iwind temperature and numbrity incutations (FYGL Project 75 BL). The data submitted by the United States are: comments by the U.S. Director; U.S. scientific program—tawks, project areas; operations and data acquisition systems; data management—physical data collection system data, rawinsonde data; and IFYGL rawinsonde system operation. (Woodard-USGS) W74-01162

PRODUCTION OF CRUSTACEAN ZOOPLANK-TON IN MOTY BAY, LAKE JEZIORAK: THE METHOD OF PRODUCTION ESTIMATION, Nicolas Copernicus Univ. of Torun, Ilawa (Poland). Dept. of Hydrobiology. W. Zawislak.

Pol Arch Hydrobiol. Vol 19, No 2, p 179-191. 1972.

Identifiers: *Crustacean zooplankton, Lakes, Methodology, Plankton, *Poland (Lake Jeziorake), *Winberg formulas, *Production.

Formulas of Winberg et al. (1965) for estimation of net production of crustacean zooplankton were modified which account for the changes in biomass increase of animals hatching from eggs and transformed into individuals of successive stages before the lapse of the period T for which production is estimated. (See also W74-01173)--Copyright 1973, Biological Abstracts, Inc. W74-01172

PRODUCTION OF CRUSTACEAN ZOOPLANK-TON IN MOTY BAY, LAKE JEZIORAK: II. ESTIMATION OF PRODUCTION OF THE PREDOMINATING SPECIES, Nicolas Copernicus Univ. of Torun, Ilawa (Po-

land). Dept. of Hydrobiology. W. Zawislak.

Pol Arch Hydrobiol. Vol 19, No 2, p 193-202. 1972.

Identifiers: *Crustacean zooplankton, Lakes, Methodology, Plankton, *Poland (Lake Jeziorak), *Production, Species, *Winberg formulas, Zooplankton

Crustacean zooplankton production was estimated during 5 mo. (May 2-Nov. 7, 1969) in a shallow and slightly eutrophized Bay Moty, Lake Jeziorak, Poslightly eutrophized Bay Moty, Lake Jeziorak, Po-land. Production was computed by 2 methods: Winberg et al. (1965), and Winberg's method modified by Zawislak (1972). The modified method gave higher values of production of the in-vestigated species. (See also W74-01172)—Copy-right 1973, Biological Abstracts, Inc. W74-01173

A PROFILE OF THE FOUR MOMENT MEA-A PROPILE OF THE FOUR MOMENT MEASURES PERPENDICULAR TO A SHORE LINE, SOUTH HAVEN, MICHIGAN, Williams Coll., Williamstown, Mass. W. T. Fox, J. W. Ladd, and M. K. Martin. Journal of Sedimentary Petrology, Vol 36, No 4, p 1126-1130, December 1966. 2 fig, 1 tab, 5 ref.

Descriptors: *Lake Michigan, *Sediment transport, Sand bars, *Energy, *Topography, *Statistics, Environments, *Beaches, *Waves (Water), *Coasts. Identifiers: Nearshore processes

A series of fourteen samples was taken along a profile crossing a beach, berm, foreshore slope, plunge point, nearshore, offshore bar, and offshore area to study the changes in the first four moments. The mean grain size and standard devia-tion reached a maximum in the plunge zone and were also high on the offshore bar. Skewness and kurtosis values were highest in the nearshore and offshore area. The beach represents a phi normal distribution of fine sand which is mixed with varying amounts of coarser material to form the sediments in the other environments. The four moments reflect the bottom topography and the dissipation of wave energy across the profile. The wave energy is first released on the sand bar where the waves break and move into the nearshore area. The bottom profile in the nearshore area is concave upward, representing equilibrium conditions for the waves encountered. In the nearshore area the waves form again but are smaller because of the energy spent in breaking on the offshore bar.
The waves once again break at the plunge point, creating an area of maximum turbulence and release of energy. A traverse of closely spaced samples across a shore line is quite effective in interpreting the effects of both wave-energy dissipation and topographic profile on sand-size distribution. The four moments should be considered together in making the final interpretation of the energy profiles. (Sinha-OEIS)
W74-01184

SHIFTING OFFSHORE BARS AND HARBOR

SHOALING, United States Lake Survey, Detroit, Mich. For primary nary bibliographic entry see Field 02J.

NOTES ON THE DYNAMICS OF THE REPRODUCTIVE ACTIVITY OF ARCTODIAP-TOMUS BACILLIFER IN HIGH ALTITUDE AL-

PINE LAKES,
Parma Univ. (Italy). Istituto di Zoologia e
Anatomia Comparata.
I. Ferrari.

Boll Zool. Vol 38, No 3, p 221-225. 1971. Illus. Identifiers: *Alpine lakes, Altitude, *Arctodiap-tomus-bacillifer, *Italy (Bognanco Valley), Lakes, Reproduction, *Diaptomids, Zooplankton.

Zooplankton samples were periodically collected from 3 Alpine lakes in the Bognanco Valley (Pied-ment, Italy), i.e., Campo 2, 3 and 4 lakes, for 2 yr 1968 and 1969, during the summer and autumn when the waters are ice free. The dynamics of the zooplankton populations, and principally of A. bacillifer, which is the ecologically dominant species in the zooplankton biocoenosis of all 3 lakes, was studies. In particular, the seasonal variations of mean clutch size of Diaptomids were considered.—Copyright 1973, Biological Abstracts, W74-01209

CURRENTS AT TOLEDO HARBOR.

United States Lake Survey, Detroit, Mich. G. S. Miller.

In: Proceedings 11th Conference Great Lakes Research, Milwaukee, Wisconsin, 1968. p 437-453, (1968), 17 fig, 8 ref.

Descriptors: *Ohio, *Currents (Water), *Wind tides, *Seiches, Surface waters, *Lake Erie.
Identifiers: *Toledo Harbor (Ohio), River discharge.

An investigation of currents at Toledo Harbor, Ohio, was conducted from May through November 1966 using Eulerian and Lagrangian

Group 2H-Lakes

techniques. The driving forces producing currents in the harbor are wind tides, seiches, and river discharge. The current is a reversing type except during periods of high river outflow. Speed histograms indicate that about 10% of the time the current speed is greater than 15 cm/sec. Spectral analysis of current speed shows that the peaks correspond to the modes of the seiche. Drogue tracks indicate that the mid-channel current is up to 2.5 times greater than that recorded near the channel edge. Opposing currents are occasionally observed because of wind induced surface currents. (Sinha-W74-01214

SOME SOURCES OF ERROR IN THE 14C METHOD FOR ESTIMATING PRIMARY PRODUCTIVITY AND THEIR RELATIONSHIP TO LIGHT INTENSITY DURING INCUBATION, Kyoto Univ., Otsu (Japan). Otsu Hydrobiological Station.

M. Nakanishi, and F. J. Ward.

Jap J Limnol. Vol 32, No 4, p 85-89. 1971. Illus. Identifiers: *Carbon-14 method, *Error, Incuba-tion, Intensity, *Japan (Lake Biwa), Light, Methodology, *Primary productivity, Lakes.

Losses in primary productivity estimates caused by desiccation of filters at Lake Biwa, Japan, ranged from 18-52% and were inversely related to the natural logarithms of light intensities during incubation. Losses caused by preservation were variable, depending on filter treatment and radioactivity counting method, but were high in scintillation determinations. Significant fractions of total differences between primary productivity estimates from liquid scintillation counts of immediately filtered wet filters and Geiger-Muller counts of immediately filtered dry filters were associated with over-estimating the relative activity of the C-14 stock solution (from 15-24%). In view of these and other causes for underestimating primary productivity, the 14C method requires further examination.--Copyright 1973, Biological Abstracts, Inc. W74-01217

BATRACHOSPERMUM VAGUM AG. IN THE SZCZECIN POMERANIA, A LOCALITY NEW TO POLAND, (IN POLISH), Wyzsza Szkola Rolnicza, Szczecin (Poland).

Katedra Botaniki. W. Kowalski

Fragm Florist Geobot (Krakow), Vol 17, No 1, p

Fragm Florist Geode (astrace), 163-169, 1971. Illus. English summary. Identifiers: *Batrachospermum-vagum, Desmidiaceae, *Dystrophy, Ecology, *Menyanthes-trifoliata, Oligotrophy, *Poland (C-zarcie Lake), Lakes Peat bogs.

It is the 4th locality in Poland, and the 3rd in Pomerania in which this freshwater seaweed has been found. Czarcie Lake is a rather small dystrophic water body situated in the forest; plant succession series can be studied in it from the open water table to the phytocenoses of the raised peat-bog. B. vagum occurs most abundantly in association with Menyanthes trifoliata. It is accompanied by other oligotrophic species, especially Desmidiaceae.--Copyright 1973, Biological Abstracts, Inc. W74-01219

INVESTIGATIONS ON THE CHANGES IN THE CONTENT OF HEAVY METALS IN LAKE WATERS OF THE MASURIAN LAKE DIS-TRICT, Wyzsza Szkola Rolnicza, Olsztyn-Kortowa (Po-

Jand). Instytut Hydrobiologii Ochrany Wodnego. For primary bibliographic entry see Field 05B. W74-01221

LIMNOLOGY AND FISHERY BIOLOGY OF BLACK LAKE, NORTHERN SASKATCHEWAN, Saskatchewan Dept. of Natural Resources Saskatoon. Fisheries Wildlife Branch. R. P. Johnson

Sask Dep Nat Resour Fish Wildl Branch Fish Rep. 9. p 6-46. 1971. Illus.

9. p 6-46. 1971. Illus. Identifiers: Biology, *Canada (Black Lake-Sask.), *Fauna, Fish, *Fishery, Lakes, Limnology, Vegetation, Geochemical properties.

Geochemical properties, vegetation, fauna and commercial fish species of this Canadian lake are presented.—Copyright 1973, Biological Abstracts, W74-01234

SWEDISH LAKE RESTORATION PROGRAM

GETS RESULTS, Lund Univ. (Sweden). Limnological Inst. For primary bibliographic entry see Field 05G. W74-01262

OXBOW CUT-OFF BOG LAKE ZOOPLANK-TON OF THE KOLYMA BASIN (IN RUSSIAN), Moscow State Univ. (USSR). Dept. of Ichthyolo-

E. A. Streletskaya.

Vestn Mosk Univ Ser 6 Biol Pochvoyed, Vol 27. Vestin Mosk of Division Solid Federation, Value No. 3, p 12-19, 1972, Illus, English summary. Identifiers: Bogs, *Cladoceran, *Copepod, Lakes, Plankton, *USSR (Kolyma basin), *Zoo plankton.

Seasonal dynamics of species composition, biomass and population density of zooplankton were investigated. In June and Oct. copepods dominated in zooplankton, biomass was low (1.70-0.67 g/m3) and population density was average (37.63-35.25 thousands of individuals per 1 m3). In July, Aug. and Sept. cladocerans dominated in zooplankton, biomass was high (10.40-12.99 g/m3). Population density varied considerably (14.38-62.54 thousands of individuals per 1 m3) and was connected with the dynamics of species and size composition of the dominant patterns of zooplank-ton.-Copyright 1973, Biological Abstracts, Inc.

THE OXYGEN STATUS OF LAKE SEDIMENTS, For primary bibliographic entry see Field 02J. W74-01266

THE BOTTOM MACROFAUNA OF THE OLIGOTROPHIC LAKE KONNEVESI, FIN-

Jyvaskyla Univ. (Finland). Dept. of Biology. For primary bibliographic entry see Field 05C. W74-01287

PLANNED DATA STORAGE METHODS FOR THE INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES, McMaster Univ., Hamilton (Ontario). Center for

Applied Research and Engineering Design. For primary bibliographic entry see Field 07C. W74-01296

A NEW SPECIES OF BOECKELLA (COPEPODA: CALANOIDA) FROM NORTHLAND, NEW ZEALAND, Waikato Univ., Hamilton (New Zealand). School of Science

of Science. For primary bibliographic entry see Field 05A. W74-01309

PROTOZOA FROM BLUE LAKE, RAOUL

ISLAND,
Massey Univ., Palmerston North (New Zealand).
Dept. of Microbiology and Genetics.
For primary bibliographic entry see Field 05C.
W74-01310

ZOOPLANKTON IN KOLYMA-INDIGIRKA LAKES (IN RUSSIAN),

G. G. Kirillova, and V. A. Sokolova.

Gidrobiol Zh., Vol 8, No 4, p 82-85, 1972.
Identifiers: Biomass, Lakes, Plankton, Taiga lakes, Tundra lakes, *USSR (Kolyma-Indigirka Lakes), *Zooplankton, *Rotifers, *Copepoda.

The zooplankton population in 14 lakes from the tundra, USSR and taiga zones were analyzed. In the summer 30 species were identified in tundra lakes. According to population, rotifers predominated followed closely by Copepoda. Cladocera were present in smaller quantities. In taiga lakes 101 species were identified. Usually more than 1/2 of the total biomass was comprised of either Cladocera or Copepoda. The biomass was higher in taiga lakes due to different degrees of overgrowing and different temperature conditions.--Copyright 1973, Biological Abstracts, Inc. W74-01341

SEASONAL VARIATION OF CHEMICAL PARAMETERS IN ALASKAN TUNDRA LAKES, Skidmore Coll., Saratoga Springs, N. Y. Dept. of

For primary bibliographic entry see Field 05B. W74-01347

MOLECULE-SIZE DISTRIBUTION OF SOLU-BLE HUMIC COMPOUNDS FROM DIFFERENT NATURAL WATERS.

H. De. Haan.

Freshwater Bio. Vol 2, No 3, p 235-241. 1972. Illus. Identifiers: *Humic compounds, *Molecule-size distribution, Natural waters, Separation techniques, Gels, Sephadex gel filtration, Mea-

The use of Sephadex G-25, Sephadex LH-20 and CPG-10-75 for the separation of soluble humic compounds from freshwater is tested. It is shown by Sephadex G-25 gel filtration that differences in molecule-size distribution of soluble humic compounds in 1 lake at different times and between lakes can be predicted by E250 and E365 (elution ratios) measurements.--Copyright 1973, Biological Abstracts, Inc. W74-01351

ON THE FORMATION OF SMALL MARGINAL LAKES ON THE JUNEAU ICEFIELD, SOUTH--EASTERN ALASKA, U.S.A.,

Turku Univ. (Finland). Institutum Geographicum. For primary bibliographic entry see Field 02C.

CHLORINATED HYDROCARBON INSECTI-CIDES IN SEDIMENTS OF SOUTHERN LAKE MICHIGAN, Illinois Univ., Urbana. Dept. of Civil Engineering.

For primary bibliographic entry see Field 05B. W74-01397

PATHWAYS OF TRACE ELEMENTS IN ARCTIC LAKE ECOSYSTEMS, Alaska Univ., College. Inst. of Marine Science.

For primary bibliographic entry see Field 05B. W74-01401

POPULATION POPULATION DYNAMICS OF POND ZOOPLANKTON, I. DIAPTOMUS PALLIDUS HERRICK,

Kansas Univ., Lawrence. Div. of Biological Sciences.

For primary bibliographic entry see Field 05C. W74-01502

CHANGES IN SPECIES COMPOSITION OF PHYTOPLANKTON DUE TO ENRICHMENT BY N, P, AND SI OF WATER FROM A NORTH FLORIDA LAKE, Florida State Univ., Tallahassee. Dept. of

Oceanography. For primary bibliographic entry see Field 05C.

THE CHEMICAL OXYGEN DEMAND OF WATERS AND BIOLOGICAL MATERIALS FROM PONDS,

Auburn Univ., Ala. Dept. of Fisheries and Allied

Aquacultures.
For primary bibliographic entry see Field 05C. W74-01543

PLANKTONIC ASSOCIATION (CLADOCERA AND COPEPODA) OF A DIMIC-TIC LAKE OF THE LAURENTIDES PARK.

QUEBEC, (IN FRENCH), Laval Univ., Quebec.

W74-01503

J. G. Bernard, and R. Lagueux.

Nat Can (Que). Vol 99, No 4, p 381-409. Illus. 1972. (English summary).

Identifiers: Bosmina-Longirostris, *Canada (Lake Bedard), *Cladocera, *Copepoda, Cyclops-Scu-tifer, Daphnia-Catawba, Diaptomus-Minutus, *Dimictic lake, Distribution, Holopedium-Gib-berum, Lakes, Parks, Plankton.

A qualitative and quantitative analysis of the crustacean association of Lake Bedard, Foret Montmorency, Quebec, Canada, was made from samples collected during summers of 1967 and 1968. The Crustacea found in Lake Bedard include 6 spp. of Copepoda and 12 spp. of Cladocera. The most important taxa are the Cladocera Holopedium gibberum, Daphnia catawba, Bosmina longirostris and the Copepoda Diaptomus minutus and Cyclops scutifer. In its vertical distribution, C. scutifer remains isolated from the rest of the association, and is located at 4 and 6 m where it is vertually alone. The other species cohabit in the epilimnion and upper part of the mesolimnion... Copyright 1973, Biological Abstracts, Inc. W74-01558

PREDICTION OF THE VARIATION IN THE CHEMISTRY OF A LAKE RESULTING FROM AN INCREASE IN SOLUBLE DEPOSITS: AP-PLICATION. NEUCHATEL, Univ. PLICATION: THE SODIUM

(Switzerland). trahydrogeologie.

Bull Soc Neuchatel Sci Nat. 95. p 165-172, 1972, II-

Identifiers: Chemistry, Lakes, Minerals, Pollution, Prediction, *Sodium ions, Soluble deposits, *Switzerland (Lake Neuchatel), *Ions.

The increase in salt consumption has increased the quantity of Na ions carried into lakes. Following some hypotheses on the variations in the quantity of salt carried in, results of application of a simplified calculation method for determining the in-crease in the average Na+ level to Lake Neuchatel (Switzerland) were given. Results showed that the average concentration of Na+ in the lake will sta-bilize about 20 yr after stabilization of the annual salt influx. The method used is valid for the increase of any inert water-soluble pollutants in a reservoir (inert in the sense of any elements not entering directly into a biocycle such as Cl. Na+. SO4-2 or in a precipitation cycle such as Fe+3, Al+3, etc.). However the method does not take factors such as ionic diffusion or thermal convections into account.-Copyright 1973, Biological Abstracts, Inc. W74-01562

OCCURRENCE AND CUMULATION OF MICROCOMPONENTS IN BOTTOM SEDI-

MENTS OF DAM RESERVOIRS OF SOUTHERN POLAND,

Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.

For primary bibliographic entry see Field 05B. W74-01565

HYDROBIOLOGICAL STUDIES ON THE LED-NICKE RYBNIKY PONDS: SPECIES COMPOSI-TION AND SEASONAL VARIATION IN THE ABUNDANCE OF PLANKTON (IN CZECH), Brno Univ. (Czechoslovakia). Hydrobiologicka Laborator.

For primary bibliographic entry see Field 05C. W74-01567

THE VEGETATION OF FINDLEY LAKE

Washington Univ., Seattle. Dept. of Botany For primary bibliographic entry see Field 05C. W74-01587

METALIMNIC LAYER IN LAKE KINNERET,

ISKAEL, Kinneret Limnology Lab., Tiberias (Israel). For primary bibliographic entry see Field 05C. W74-01598

FURTHER STUDIES OF FISH PREDATION ON SALMON STOCKED IN MAINE LAKES, Maine Dept. of Inland Fisheries and Game. Ban-

gor. K. Warner.

Prog Fish-Cult. Vol 34, No 4, p 217-221. 1972. Illus.

Ins.

Identifiers: Esox-Niger, *Fish predation, Lakes,
Lota-Lota, *Maine, Micropterus-Dolomieui,
Micropterus-Salmoides, Perca-Flavescens,
Salmo-Salar, Salmo-Trutta, *Salmon stocking,
Salvelinus-Namaycush, Stocked.

The role of 13 fish species as predators on newly stocked salmon (Salmo salar) was evaluated for 69 plantings in 36 Maine lakes from 1965-70. Four of the eight warmwater fishes studied preved on salmon to some degree. Chain pickerel (Esox niger) were the most serious predators on stocked salmon, but pickerel predation was significantly reduced by scatter planting salmon over deep water. Smallmouth bass (Micropterus dolomieui) and largemouth bass (Micropterus salmoides) were also significant predators in some instances. Yellow perch (Perca flavescens) preyed on stocked salmon to a limited extent. Four of the five coldwater species studied preyed on newly stocked salmon, Burbot (Lota lota) appeared to be the most serious potential coldwater predator. Brown trout (Salmo trutta), lake trout (Salvelinus namavcush), and other salmon preyed on newly stocked salmon, but the degree of predation by salmonids is probably not of serious magnitude in most instances.—Copyright 1973, Biological Ab-W74-01603

DISTRIBUTION AND MORPHOLOGICAL VARIATION OF LAMPSILIS RADIATA (PELECYPODA, UNIONIDAE) IN SOME CEN-DISTRIBUTION TRAL CANADIAN LAKES: A MULTIVARIATE STATISTICAL APPROACH,

Manitoba Univ., Winnipeg. Dept. of Zoology. R. H. Green.

J Fish Res Board Can. Vol 29, No 11, p 1565-1570.

Identifiers: *Anodonta-Grandis, *Canada, Dis-*Lampsilis-Radiata tribution. Lakes, Morphological variation, Pelecypoda, Statistical methods. Unionidae.

Discriminant analysis performed on 62 samples containing Anodonta grandis and 52 samples containing L. radiata collected from 19 lakes in central Canada indicated separation in terms of an environmental factor which was interpreted as suitability of water chemistry for construction of shell. A canonical correlation analysis on morphological and environmental variables for 70 specimens of L. radiata yielded 2 highly significant canonical variates which related components of environmental variation to components of morphological variation. One was interpreted as variation in water turbulence, which primarily affected overall size. The other was similar to the factor which separated A. grandis from L. radiata and was in-terpreted similarly. Shell weight, or thickness, rather than overall size, was affected. Environments were successfully predicted for shells from 2 locations not included in the original analysis. Copyright 1973, Biological Abstracts, Inc. W74-01608

A MATHEMATICAL MODEL OF PRIMARY PRODUCTIVITY AND LIMNOLOGICAL PATTERNS IN LAKE MEAD,

Arizona Univ., Tucson. For primary bibliographic entry see Field 05C. W74-01630

FRESHWATER MUSSEL ECOLOGY, KEN-TUCKY LAKE, TENNESSEE, MAY 1, 1969--JUNE 15, 1972,

Tennessee Game and Fish Commission, Nashville. For primary bibliographic entry see Field 05C. W74-01641

2I. Water in Plants

NUMBER AND SIZE OF DRIFTING NYMPHS OF EPHEMEROPTERA, CHIRONOMIDAE, AND SIMULIDAE BY DAY AND NIGHT IN THE RIVER STRANDA, WESTERN NORWAY, Bergen Univ. (Norway). Zoological Museum

I. Steine

Nor Entomol Tidsskr. Vol 19, No 2, p 127-131. 1972. Illus.

Identifiers: *Chironomidae, Drifting fauna, *Ephemeroptera, *Norway (River Stranda), *Nymphs, Rivers, *Simuliidae, Size, Western.

Observations on the drift fauna in River Stranda (Voss, western Norway) were carried out in Aug. 1969. Quantitative samples were taken at hourly intervals throughout a 24-hr period at 2 different localities in the River Stranda. The nymphs of Ephemeroptera, Chironomidae, and Simuliidae were most abundant. The body size of drifting nymphs of the Ephemeroptera varied according to the time of day, with small individuals making up the population during day-time and larger animals at night. No such diurnal change was observed in the case of the Chironomidae and Simuliidae.--Copyright 1973, Biological Abstracts, Inc. W74-01230

THE EFFECT OF SAND DEPOSITION UPON THE MACRO-INVERTEBRATE FAUNA OF THE RIVER CAMEL, CORNWALL, Cornwall River Authority, Launceston (England).

Freshwater Biol. Vol 2, No 3, p 181-186. 1972, Illus.

Identifiers: Baetis-Rhodani, Deposition, *England (River Camel), *Fauna (Invertebrates), Rhitrogena-Semicolorata, Rivers, *Sand deposits, Erosion, Tubificidae.

Erosion from a tributary of the River Camel (England) deposited an estimated 10,000 m3 of sand in the main river over a period of 2 yr. The poor incidence of plants and macro-invertebrates from the river was associated with the unstable shifting nature of the sand deposits, rather than turbidity or abrasion caused by particles in suspension. Sand deposition accounted for the low diversity of

Group 21-Water in Plants

invertebrate species below the tributary, and resulted in the elimination of several species which were frequent upstream. Baetis rhodani, Rhithrogena semicolorata, and Tubificidae were abundant where sand deposition had occurred.--Copyright 1973, Biological Abstracts, Inc.

BIOLOGY OF THE ALABAMA SHAD IN

NORTHWEST FLORIDA,
Florida Dept. of Natural Resources, St. Petersburg, Marine Research Lab. J. G. Mills, Jr.

Fla Dep Nat Resour Mar Res Lab Tech Ser. 68 p 1-24. 1972, Illus.

Identifiers: Alabama, Biology, (Apalachicola River), Georgia, *Shad (Alabama).

Biology of Alabama shad, Alosa alabamae, in the Apalachicola River, was studied from June 1968-April 1971. Adults enter the river in Feb. and spawn in April. Spawning occurs at 19-22C in moderate currents over bottom of coarse sand and gravel. Fecundity ranges from 61,238-257,655. Gonads of shad entering the river were in ripe condition with stage IV oocytes averaging 1159 micro in diameter. The 1969 collection contained 38.3% repeat spawners while the 1970 collection contained 6.3%. Mean fecundity increased 25.8%, although repeat spawners decreased 32%. Adult males enter the river in larger numbers than females at water temperatures below 72C. Adult shad do not feed during the spawning run. One, two and three yr old shad make the spawning run. Female mean length and weight were 394 mm (TL/total length)) and 737 g while male mean length and weight were 349 mm (TL) and 474 g. Length frequency analysis of juveniles indicate progeny of 3 spawning groups, their origins being the Chipola River, the Cattahoochee-Flint River, and the Jim Woodruff Dam. Most juvenile shad grew 30 mm/mo. Juveniles emigrate from the river at 125 mm (FL/fork length) or in Dec. Sport fishing potential is good since catch frequency is estimated as one shad/rod every 19.72 min.--Copyright 1973, Biological Abstracts, Inc.

SENSITIVITY OF CELL DIVISION AND CELL ELONGATION TO LOW WATER POTENTIALS IN SOYBEAN HYPOCOTYLS, Illinois Univ., Urbana. Dept. of Botany. For primary bibliographic entry see Field 03F.

W74-01249

DIE-BACK IN THE MIXED HARDWOOD FORESTS OF EASTERN VICTORIA: A PRELIMINARY REPORT,

Forests Commission of Victoria, Melbourne (Aus-

For primary bibliographic entry see Field 04A. W74-01251

DIATOMS OF THE UPPER COURSE OF THE STREAM SANKA (CRACOW-CZESTOCHOWA UPLAND), (IN POLISH),

Polish Academy of Sciences, Krakow. Instytut Botaniki.

K. Hoida. Fragm Florist Geobot (Krokow). Vol 17, No 3, p 445-454. 1971, Illus, (English summary).

Identifiers: *Diatoms, *Poland Czestochowa upland), Seasonal, (Cracow-Streams. Uplands.

The bottom of the stream Sanka in the investigated section (Poland) is partly sandy, covered with calcareous stones or with a layer of slime. It is up to 4 m wide, the depth of water is 50 cm. The material was collected in summer and autumn 1969.--Copyright 1973, Biological Abstracts, Inc. AUTECOLOGY OF ATRIPLEX POLYCARPA

ROBERT OF ARTHUR Henrigy, Vol.3, No.8, p. 193-1102. 1972. Identifiers: Atripleto-Brometum, *Atriplex-Polycarpa, *Autoecology, California (San Joaquin valley), Ecology, Germination, Growth, Haloxylon-Articulatum, Light, Moisture, Salinity, Salsola-Vermiculata-Var-Villosa, Temperature, Wilt-*Atriplex-

Atriplex polycarpa (Torr.) Wats. was a dominant, palatable shrub of the xeric Atripleto-Brometum disclimax in the San Joaquin valley of California. Overgrazing and agriculture during the past 100 yr have restricted its present distribution to saline or fenced areas. Optimal germination temperatures (9-15C) are close to those that prevail in nature in Nov., the month of utricle dispersal. Germination is rapid and can occur over a wide range of temperatures (3-33C); it is reduced by light and NaC1 greater than 1%, but indifferent to temperature al-ternation and soil CaCO3 content. It is unlikely that the bracteoles contain inhibitors. In a field plot in the Temblor Range of California, during a growing season with 115 mm precipitation the seeds sown produced an established seedling, possibly because of competition by introduced ar nuals. Optimal growth conditions were 18-hr photoperiod, 24 plus or minus 4C. Growth at 12C was quite slow. If conditions are favorable A. polycarpa can produce a large biomass, but it possesses a long juvenile stage of greater than 2 yr prior to flowering. The base value of shoot water potential at no moisture stress is -18 bars, but this can be modified downward by pre-exposure to minor cycles of drought. This species can endure soil moisture below that which causes ultimate wilting of sunflower plants and can recover from a shoot water potential as low as minus 69 bars. Plants in nature, in Aug., exhibited a shoot water potential as low as minus 58 bars. This species is compared in a number of ways to Syrian ecological equivalents Haloxylon articulatum and Salsola vermiculata var. villosa .-- Copyright 1973, Biological Abstracts, Inc. W74-01259

SPRING FLOODING AND FAUNA (IN RUS-

SIAN), N. K. Sukhodol'skaya. Vestn Zool, Vol 6, No 4, p 89, 1972. Identifiers: Adder, Beaver, Deer, Ermine, Fauna,

*Flooding, Fox, Grass, Hare, Marten, Snake, Tortoise, *USSR (Kanevskii National Reserve), Weasel, *Animal migration.

The movement of foxes, deer, martens, ermines, weasels, beaver, hares, tortoises, grass snakes and adders from an island in the Kanevskii National Reserve, USSR, is traced during its submergence in the spring floods of 1970.—Copyright 1973, Biological Abstracts, Inc. W74-01261

INVERTEBRATE FAUNA OF WATERS OF THE STATION 'AGAPA' (WESTERN TAIMYR), (IN RUSSIAN).

Vestn Mosk Univ Ser 6 Biol Pochvoved, Vol 27, No 4, p 98-100, 1972, English summary. Identifiers: Acanthocyclops-viridis, Asplanchnapriodonta, Cyclops-strennus, Daphnia-pulex, Eucypris-glacialis, Eurycercus-glacialis, Fauna, Heterocope-borealis, Flavertebrate fauna, Lepidurus-arcticus, Polyartemia-forcipata, Tai-myr, *USSR (Agapa River).

A study of the invertebrate fauna in lakes and rivers near the Agapa river in western Taimyr, USSR revealed 2 groups of invertebrates. The first group was those that are extensively distributed in various regions of USSR: Acanthocyclops viridis, Cyclops strennus, Daphnia pulex, and Asplanchna priodonta. The second group was species characteristic for northern waters such as Heterocope borealis, Eurycercus glacialis, Eucypris glacialis, Lepidurus arcticus, and Polyartemia forcipata.-Copyright 1973, Biological Abstracts, Inc. W74-01264

REVISIONS AND NEW TAXA IN NEW ZEA-LAND NOTONEMOURIDAE (INSECTA: PLECOPTERA), (INSECTA: I. D. McLellan.

New Zealand Journal of Marine and Freshwater Research, Vol 6, No 4, p 469-481, December 1972.

Descriptors: *Systematics, *Stoneflies, Ecology,

Identifiers: Spaniocercoides hudsoni, Spaniocercoides cowleyi, Spaniocercoides fimbria, Omanu-perla bruningi, Macroinvertebrates, Cristaperla

A revised diagnosis of Spaniocercoides is given, S. hudsoni Kimmins is redescribed, its larva described for the first time, and notes on variation and ecology are added. Additions and amendments to the description of S. cowleyi (Winterbourn), and notes on its ecology are given. S. fimbria Winterbourn is removed to Cristaperla gen. nov., and the male epiproct, the female and part of the larval exuviae are described for the first time. Omanuperla gen. nov. is erected to contain O. bruningi sp. nov. Notes on the origin and structure of ovipositors and keys to imagines and larvae are given. W74-01299

REVISION OF FAMILY AND SOME GENERIC DEFINITIONS IN THE PHAENNIDAE AND SCOLECITHRICIDAE (COPEPODA: CALA-

NOIDA), New Zealand Oceanographic Inst., Wellington. Dept. of Scientific and Industrial Research. For primary bibliographic entry see Field 05A. W74-01308

DIATOM FLORA OF THE GRAND RIVER, ON-TARIO, CANADA,

Waterloo Univ., (Ontario). Dept. of Biology For primary bibliographic entry see Field 05A. W74-01311

GROWTH RATE AND DEVELOPMENT OF THE ROOT/SHOOT RATIO IN REEDSWANP MACROPHYTES GROWN HYDROPONIC CULTURES, Ceskoslovenska Akademie IN WINTER

Ved. Botanicky Ustav.

D. Dykyjova, P. Ondok, and D. Hradecka. Folia Geobot Phytotaxon. Vol 7, No 3, p 259-268. 1972. Illus.

Identifiers: Bulboschoenus-Maritimus, Growth rate, Humidity, Hydroponic cultures, *Macrophytes, Morphology, Phragmites-Commucultures. nis, *Reed swamp plants, Schoenoplectus-Lacus-tris, Season, Species, Swamp, Temperature, Typha-Angustifolia, Winter, *Root/shoot ratio.

Littoral emergent macrophytes develop a complicated system of underground perennial organs, which propagate by tillers, bulbs or rhizomes forming extensive colonies. In natural habitats, it is sometimes not possible to estimate the annual production of these organs. The distribution of the biomass into above ground and underground or-gans was followed during the initial stage of polycormone development in winter hydroponic cultures. The plants were cultivated from lateral winter buds, rhizome cuttings and seedlings on a solid substrate, flooded with a nutrient solution. Two temperature regimes (15 degrees and 20 degrees) and 3 different dates of autumn and winter planting were chosen. Data on temperature, relative humidity, and density of incident solar

Water in Plants—Group 21

radiation were recorded. The growth rhythm of shoots, leaves and underground organs was fol-lowed and the increase of the leaf area, biomass dry weight and the ratio of the underground to the above ground biomass R/S from successive samples were estimated. In all species planted in Nov. the leaf area development, growth, final standing crop and the root/shoot (R/S) ratio were smaller than in the winter plantings, which was caused by an incomplete period of dormancy. The winter plantings showed a larger biomass of plants and leaf area increase, which in Feb. and March, was even more stimulated by the higher densities of ir-radiation. In all species, the R/S ratio shifted with the growth and the biomass increase in favor of the underground organs. Four phases of growth and the distribution pattern of both the above ground and underground organs during the initital phase of polycormone development were distinguished. The R/S ratio may be a relatively constant quantitative species characteristic, but only for a given growth phase.--Copyright 1973, Biological Abstracts, Inc. W74-01346

NEW RECORDS OF SARGASSUM HAWAIIEN-SIS DOTY AND NEWHOUSE (SARGAS-SACEAE, PHAEOPHYTA), A DEEP WATER SPECIES,

Hawaii Univ., Honolulu. Dept. of Botany. R. E. De Wreede, and E. C. Jones. Phycologia, Vol 12, Nos 1/2, p 59-62, June 1973. 2

Descriptors: *Phaeophyta, *Deep-water habitats, *Systematics, *Marine algae, Kelps, Speciation, Plant morphology, Plant groupings, *Hawaii. Identifiers: *Sargassum hawaiiensis.

Sargassum hawaiiensis Doty and Newhouse was described in 1966 from a fragmentation specimen dredged from a depth of 50 m off Oahu, Hawaii. Until recently, no further collections have been available for study. In 1968 and 1971 new material was collected from Penguin Banks off Molokai, Hawaii, during shrimp trawling operations by the National Marine Fisheries Service vessel Townsend Cromwell'. The specimens were obtained from depths of 183 and 200 meters. A complete description of the species is given, which differentiates it from the three other species of Sargassum recognized from Hawaii. Sargassum hawaiiensis is distinguished by a combination of characteristics, these being: simple spines on some branches, terete vesicle petioles, muticous and spherical vesicles and bifurcate receptacles with narrow sterile bridges. (Holoman-Battelle) W74-01349

SUBLITTORAL BENTHIC MARINE ALGAE OF SOUTHERN CAPE COD AND ADJACENT ISLANDS: PSEUDOLITHODERMA PARADOX-UM SP. NOV. (RALFSIACEAE, ECTOCAR-PALES),

Massachusetts Univ., Gloucester. Marine Station. For primary bibliographic entry see Field 05A. W74-01350

DETERMINATION OF LOW CONCENTRA-TIONS OF COBALT IN PLANT MATERIAL BY ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Western Australia Univ., Nedlands. Inst. of ATOMIC

Agriculture.

For primary bibliographic entry see Field 02K. W74-01356

EFFECT OF THE DESNA RIVER FLOOD ON DEVELOPMENT OF VEGETATION AND FLORA OF THE OSTER OUTSKIRTS

M. I. Kotov. Ukr Bot Zh., Vol 29, No 4, p 514-517, 1972. (En-

Identifiers: Achillea-Borysthenica, Acorellus-Pannonica, Artemisia-Dniproica, Callitriche-Palustris-F-Minima, Chenopodium-Acerifolium, Dichostylis-Mitchelliana, *Floods, *Flora, Galium-Salicifolium, Reproduction, River, Rumex-Ucrainicus, Senecio-Tataricus, *USSR (Desna River), Valeriana-Nitida, *Vegetation, Willow, Xanthium-Californicum.

For 8 yr (at summer time) development of vegetation in an area of 6 x 3 km sq on the left bank of the Desna river within the outskirts of Oster, the Chernigov region (USSR) was observed. Th was on sandy hills, in the flood plain willow forest of white willow and on the riparian alluvial sands. was established that periods of development in different species vary in different years. The Desna river was particularly large in 1970. Water took the aquatic and riparian plants to high areas where they germinated. Bloom and fruiting under such conditions in Callitriche palustris L. f. minima (L.) Rchb. was recorded. Gigantism was observed in Valeriana nitida Kreyer., Senecio tataricus Less. and other plants growing near the border of a willow forest. Many endemic plants grow in the flood plain of the Desna river, such as: Rumex ucrainicus Fisch., Dichostylis michelliana (R. et Sch.) Nees., Chenopodium acerifolium Andrz., Acorellus pannonicus (Jacq.) Palla, Gali-um salicifolium Klok., Achillea borysthenica Klok., Artemisia dniproica Klok. Many adventitious plants -- Copyright 1973, Biological Abstracts. Inc. W74-01362

PHYTOPLANKTON OF THE CZECHOSLOVAK SECTOR OF THE DANUBE AND OF THE ESTUARIES OF THE PRINCIPAL TRIBUTA-RIES ON CZECHOSLOVAK TERRITORY, (IN CZECT.),

Slovenske Narodne Muzeum, Bratislava (Czechoslovakia)

S. Juris Zh Slov Nar Muz Prir Vedy. Vol 18, No 1, p 19-27. 1972. Illus.

Identifiers: Asterionella-Formosa, zechoslovakia (Danube River), Density, Estua-ries, Melosira-Distans-Alpigena, *Phytoplankton, Stephanodiscus-Hantzschii, Temperature, Trans-parency, Tributaries, Velocity, *Sampling.

Water samples taken from 5 different localities of the Danube contained an average of 5150 cells/ml. Altogether 63 taxa of algae were identified. The dominant phytoplankton species were Stephanodiscus hantzschii, Melosira distans var. alpigena and Asterionella formosa which are autochthonous species of the river. The tributaries have a lower phytoplankton density than the Danube. Phytoplankton multiples in the Danube with blind arms of the river and various ponds in the inundation area are the principle supply sources. The Danube was found to have a lower transparency of water, lower flow velocity and higher water temperature. The Danube and tribu-taries contained 86 different taxa.—Copyright (c) 1973, Biological Abstracts, Inc.

PROFILE OF THE VEGETATION OF THE EL-BURS MOUNTAIN RANGE (NORTHERN IRAN), (IN GERMAN),

Paedogogische Hochschule, Loerrach (West Germany).

Bot Jahrb Syst Pflanzengesch Pflanzengeogr. Vol 91, No 4, p 496-520. 1972, Illus, (English summa-

Identifiers: *Aridity, Beech, Carpinus, Cypress, Elburs, *Iran (Elburs Mt. Range), Juniperus-Macropoda, Moss, Mountain ranges, Parrotia-Persica, Quercus-Macranthera, Thuja-Orientalis, *Vegetation, Winds, *Forest zones.

Four vegetation transects through the Elburs mountain range are described: Transect A (Rasht,

Sefidrud) is determined by the piercing of the Sefidrud River through the main chain of the Elburs. In this valley, cypress groups border on ele-ments of a half-moist deciduous forest as well as on the dry Juniperus forest of the south. In the valley of the Rud-e-Molla Ali, moss pads on the rocks as far as 40 km south of the main chain indicate the as ia a so was mount of the main chain indicate influence of the moist Caspian winds. Transect B (Chalus-Karadj) and C (Babolsar-Semnan) represent the vegetational distribution of the Central Elburs: the low mesozoic northern bordering chain which catches the first orographic rains is composed of a dense moist forest, the Hyrcanian Lowland Forest, with its characteristic tree Parrotia persica. In the valley of the Chalus River, a dry basin landscape with cypress trees meets im-mediately the Lowland Forest Zone. In the Talar valley, this dry intermediate region lies 400 m higher, between the upper and lower borders of the mountain forest. Whereas beech dominates the Caspian Mountain Forest up to 1600 m, oaks and Carpinus prevail in higher levels. The upper forest limit, at present about 2000-2600 m, is an aridity border. Subalpine coniferous forests as well as alpine dwarf bush formation are lacking: Quercus macranthera bush is bordering immediately on thorncushion and tall-herb vegetation. In lower altitudes of the southside there are remnants of the formerly widespread J. macropoda dry forest. Transect D (Shahpasand-Khordabad) is not far from the eastern arid border of the Hyrcanian Forest area. Judas trees, adapted to the dryer climate, thrive beside oaks. In a dry intermediate zone Thuja orientalis takes the place of the cypresses of the Chalus and Sefidrud valleys. Two ctors are especially important for the horizontal arrangement of the vegetation: the minimum temperature of the winter and the water supply.--Copyright 1973, Biological Abstracts, Inc. W74-01385

BRYOCENOLOGICAL RESEARCH IN SOME AREAS OF THE IRON GATE OF THE DANUBE, (IN RUMANIAN),

T. I. Stefureac, and G. Mihai. Stud Cercet Biol Ser Bot. Vol 24, No 2, p 117-122,

Identifiers: *Bryocenological studies, Eurhynchium-Swartzii, Fissidens-Taxifolius, Forests, Grim-mia-Pulvinata, Humidity, Madotheca-Platyphylla, Neckera-Crispa, Orthotrichum-Saxatile, Pellia-Fabbroniana, *Romania (Danube River), *Vegeta-

The structure and the vegetation of bryophytes in some sectors (Cazanele Mari, Svinita-Tricule, etc.) of the Iron Gates of the Danube in southwestern Romania are analyzed. Four associations are described with mention of charac-Schistidietum apocarpae Stefu. 1940, Ass. Hedwigietum medioeuropaeum (Allorge 1922) v. Huebsch. 1955, Ass. Grimmia pulvinata-Orthotrichum saxatile Stodiek 1937 and Ass. Oxtra Charles and vrrhynchietum rusciforms Gams 1927, as well as certain aspects of the moss vegetation with Eurhynchium swartzii-Fissidens taxifolius; Pellia fabbroniana Neckera crispa and Madotheca platyphylla. A series of 6 phytocenologic tables are presented, indicating their saxicolous xerophile-photophile or hygro-hydrophile character and the classification of some of these in the forest vegetation .-- Copyright 1973, Biological Abstracts,

ELEMENT CONSTITUTION OF SELECTED AQUATIC VASCULAR PLANTS FROM PENNSYLVANIA: SUBMERSED AND FLOAT-ING LEAVED SPECIES AND ROOTED EMER-

W74-01453

W74-01526

GENT SPECIES, Pennsylvania State Univ., University Park. Dept. For primary bibliographic entry see Field 05A.

Group 21-Water in Plants

THE AMOUNT OF SPACE AVAILABLE FOR MARINE AND FRESHWATER FISHES,

California State Univ., Fullerton. Dept. of Biolo-

U S Natl Mar Fish Serv Fish Bull, Vol 70, No 4, p 1295-1297, 1972.

Identifiers: *Fishes, Freshwater fish, *Marine

Marine fishes have 10-10,000 times more space available per individual than freshwater forms. On the basis of total numbers per species, the difference per unit volume between the oceans and freshwater is only 10-fold whereas on the basis of species per unit volume, the difference is approximately 7500-fold .-- Copyright 1973, Biological Abstracts Inc W74-01561

PERSISTENCE OF HEADWATER CHECK DAMS IN A TROUT STREAM, California Univ., Berkeley. School of Forestry

and Conservation.

R. Gard.

J Wildl Manage, Vol 36, No 4, p 1363-1367, 1972. Identifiers: *California (Sagehen Creek), Dams, Salvelinus-fontinalis, Streams, *Brook trout,

The condition of a series of small dams constructed in 1957 in the headwaters of Sagehen Creek, California, was determined in 1969. Changes in a population of brook trout (Salvelinus fontinalis) introduced into the new ponds were also assessed. After a 12-yr period, about half of the dams were in good to excellent condition.

Average depth of the ponds decreased from 16 to 10 in, but holes 9-13 in deep were created below the dams. The standing crop of trout of catchable sizes (> or equal to 100 mm in length) was estimated to be 93 trout weighing 9.6 lbs (equivalent to 394 trout/acre weighing 41 lbs). This is comparable to the standing crop in 6 miles of stream below the headwaters of Sagehen Creek. The cost of constructing the dams and introducing the trout was \$154, or \$12.80/yr over the 12-yr period.--Copyright 1973, Biological Abstracts, Inc. W74-01566

A NEW TYPE OF CLIMATIZED GAS EXCHANGE CHAMBER FOR NET PHOTOSYNTHESIS AND TRANSPIRATION MEASUREMENTS IN THE FIELD, Wuerzburgh Univ. (West Germany). Boranisches

Institut II.

E. D. Schulze. Oecologia (Berl), Vol 10, No 3, p 243-251, 1972, Il-

Identifiers: *Carbon dioxide, Climatized control, *Gas exchange chamber, Mesophyll, *Photosynthesis, Measurements. Transpiration.

A temperature- and humidity-controlled plant chamber for CO2 and water exchange measurements in the field is described in which the heat exchanger assembly and humidity controlling water vapor trap are separated from the plant cuvette. The shape and construction material of the plant cuvette can vary according to the demands of the experimental conditions and the size and growth form of the plant. The natural illumination field is only slightly altered in this plant cuvette. In the chamber, the temperature and humidity conditions can either be held constant throughout a wide range of conditions or can be programmed to track ambient conditions. In this manner, not only temperature and absolute humidity are replicated, but it is also possible to reproduce the natural conditions of water vapor gradient between the evaporating surfaces in the mesophyll and the atmosphere, the relative humidity of the air, and the temperature difference between the leaf and the ambient air. Thus, the chamber appears to be an appropriate instrument to investigate with sufficient accuracy the reactions of individual plants in

cultivation or in natural communities under field conditions .-- Copyright 1973, Biological Abstracts, W74-01568

ESTABLISHMENT EXPERIMENTAL OF FOREST PLANTATIONS ON SANDS, IN AC-CORDANCE WITH THE IDEA OF VYSOTSKII (IN RUSSIAN), I. M. Krivokobyl'skii.

Lesovod Agrolesomelior Resp Mezhved Temat Nauchn Sb. 20. p 91-95, 1970.

Identifiers: Acer-negundo, Apricot, Black locust, Caragana-arborescens, *Fertilizers, *Forests, Honey locust, Mahaleb cherry, Peat, Plantations, *Sands, *USSR (Lower Dnieper Sands).

Analysis is made of the 1937 trial planting of tree and shrub species inside the Aleshkovskaya Arena (plot) in the Saga area (Lower Dnieper Sands) on highly elevated deep monophase sands with ground waters at a depth of 3 m. Plantings were made according to the idea of G. N. Vysotskii, the essence of which consisted of the introduction under the forest plantation of a water-absorbing nutritive interlayer of pure peat (P), of P with mineral fertilizers (F) (ammonium nitrate and superphosphate with 90 kg/ha each of active component) (P + F), of pure loess-like loam (LLL), LLL with mineral fertilizers (LLL + F), and of mineral fertilizers only. P and LLL were placed in ditches 1 m wide, with a distance between the ditches of 8 m, in interlayers 10 cm thick to a depth of 30-40 and 40-50 cm, whereas mineral fertilizers were placed at a depth of 20-30 cm. At the end of the first year after planting, good height growth, in comparison with the control was observed in the interlayer of pure P in Caragana arborescens (50fold increase of increment). Also mahaleb cherry and honey locust responded well (36-48-fold increase of increment). Some species in the variant P + F grew even better, in honey locust the increment increased 100-fold, in black locust-29-fold, in apricot and in Acer negundo--20-fold and 23-fold, respectively. A good increment was also observed in the variant LLL + F (the increment of honey locust increased 111-fold). In all the broad-leaved tree species the growth began to slow and afterward stopped altogether .-- Copyright 1973, Biological Abstracts. Inc. W74-01569

CARBOHYDRATE AND WATER BALANCE OF BEANS (VICIA FABA) AT-TACKED BY BROOMRAPE (OROBANCHE CRENATA),
Royal Univ. of Malta, Valletta. Dept. of Biology.

For primary bibliographic entry see Field 03F. W74-01575

DESERT **DOGMA** REEXAMINED: ROOT/SHOOT PRODUCTIVITY AND PLANT

California Univ., Davis. Dept. of Botany. M. G. Barbour.

Am Midland Nat. Vol 89, No 1, p 41-57. 1972. Identifiers: Allelopathy, Desert vegetation, Moisture, *Plant spacing, *Root/shoot productivi-

The factual basis for 3 generally accepted concepts about desert vegetation is reviewed, and found wanting. The concepts must, at least, be strictly qualified. The concepts are: net primary productivity is low; desert perennial plants possess a fast-growing root system which produces a high root/shoot ratio, and perennials tend to be distributed in a regular pattern, due to competition for moisture or allelopathic interactions. Areas for further research and documentation are indicated .--Copyright 1973, Biological Abstracts, Inc. W74-01585

FACTORS AFFECTING THE DISTRIBUTION OF SOME PHRYGANEAEID (TRICHOPTERA) IN MALHAM TARN, YORKSHIRE, Nature Conservancy, Aberystwyth (Wales).

Freshwater Biol. Vol 1, No 2, p 149-158. 1971, Illus

Identifiers: *Agrypnetes-Crassicornis, Chara, Dispersal, Distribution, Habitat, *Phryganea-Obsoleta, Phryganeaeid, Potamogeton, *Trichoptera, *United Kingdom (Malham Tarn-Yorkshire).

A distribution problem involving Agrypnetes crassicornis and Phryganea obsoleta (Trich-op-tera:Phryganeidae) in Malham Tarn, Yorkshire (United Kingdom) is described. The only suitable habitat for their larvae is offshore vegetation, chiefly Chara delicatula, but owing to the specialized egglaying behavior of this family and the absence of other sites, the eggs of A. crassicornis are laid on the exposed rocky shoreline. The situation with P. obsoleta differs in that the emergence of Potamogeton spp. provides new oviposition sites away from the shore. Investigations on both species, however, have provided further support for an hypothesis which postulates the importance of wind-induced water movements in rapidly dispersing newly hatched insect larvae to the favorable habitats in deep water .-- Copyright 1973, Biological Abstracts, Inc.

SEASONAL WATER POTENTIAL PATTERNS IN THE MOUNTAIN BRUSH ZONE, UTAH, Saint Louis, Univ., Mo. Dept. of Biology. S. J. Dina, L. G. Klikoff, and M. B. Keddington.

Am Midland Nat. Vol 89, No 1, p 234-239. 1973. Identifiers: Acer-Spp., Artemisia-Tridentata, Berberis-Repens, Betula-Occidentalis, Cercocarpus-Ledifolius, Elevation, Paxistima-Myrsinites, Purshia-Tridentata, Quercus-Gambelii, Regression analysis, Seasonal, Seasons, Temperature, *Utah, *Mesic habitat, *Mountain brush zone.

Species in a mesic habitat (Acer negundo, A. grandidentatum, Berberis repens, Betula occidentalis) have higher seasonal water potentials than those in a xeric habitat (Artemisia tridentata, Purshia tridentata, Quercus gambelli), but interspecific water potential patterns vary considerably within as well as between habitats. Of 5 spp. studied along an altitudinal gradient, water potential of Q.gambelii, A. gradidentatum and Pachistima (Paxistima) myrsinites increased with elevation. while B. repens and Cercocarpus ledifolius did not. All species except C. ledifolius exhibited some seasonal decrease in water potential. Seasonal water potential patterns of evergreen species did not differ from those of deciduous species. Linerar multiple regression analyses of several environmental variables indicated that temperature is most often significantly correlated variation in water potential. Only in C. ledifolius was some temperature measurement not significant.--Copyright 1973, Biological Abstracts, W74-01588

UNUSUAL OCCURRENCE OF THE BROOK STICKLEBACK (CULAEA INCONSTANS) IN THE MACKENZIE RIVER, NORTHWEST TER-RITORIES.

Department of the Environment, Winnipeg (Manitoba). Fisheries Service.

M. R. Falk.

J Fish Res Board Can. Vol 29, No 11, p 1655-1656. 1972.

Identifiers: *Brook stickleback, *Canada (Mackenzie River-N.W.T.), Culaea-Inconstans,

Two specimens of the brook stickleback (C.inconstans) were taken in the mouths of Pierre and Tsital Trien creeks near Arctic Red River on the Mackenzie River, Canada, during 1971. Previous

most northerly published records were from the south shore of Great Slave Lake. The specimens may have been carried downstream by spring floods and may not represent a resident popula-tion.--Copyright 1973, Biological Abstracts, Inc. W74-01589

CARBON DIOXIDE EXCHANGE BY SEVERAL STREAM-SIDE AND SCRUB OAK COMMUNITY SPECIES OF RED BUTTE CANYON, UTAH, Saint Louis Univ., Mo. Dept. of Biology. S. J. Dina, and L. G. Klikoff.

Am Midland Nat. Vol 89, No 1, p 70-89. 1973, Il-

Identifiers: Acer-Grandidentatum, Acer-Negundo, Artemisia-Tridentata, Berberis-Repens, Canyons, *Carbon dioxide, Community, Exchange, Moisture, *Oak, Purshia-Tridentata, Artemisia-Tridentata, Quercus-Gambelii, Scrub oak, Species, *Utah (Red Butte Canyon).

Species of a xeric scrub oak community (scrub oak, Quercus gambelii; sagebrush, Artemisia tridentata; bitterbrush, Purshia tridentata) have lower seasonal water potentials than species of a mesic streamside habitat (BOX ELDER, Acer negundo; bigtooth maple, A. grandidentatum; creeping barberry, Berberis repens). The restriction of box elder to mesic sites is, in part, a function of its physiological responses to moisture stress. Positive net photosynthesis of box elder ceases at water potentials 10 to 15 bars higher than net photosynthesis of the other species, and dark respiratory rates of box elder decline more rapidly. The relative photosynthetic and dark respiratory responses to water stress of scrub oak, sagebrush, Bitterbrush, bigtooth maple and creeping barberry are apparently not significant factors influencing the distribution of these species .-- Copyright 1973, Biological Abstracts, Inc. W74-01590

GERMINATION RESPONSES OF A TEXAS POPULATION OF OCOTILLO (FOUQUIERIA SPLENDENS ENGELM.) TO CONSTANT TEM-PERATURE, WATER STRESS, PH AND

Texas Univ., El Paso. Dept. of Biological

Sciences

C. E. Freeman. Am Midland Nat. Vol 89, No 1, p 252-256. 1973, Illus.

Identifiers: Fouquieria-Splendens, *Germination, *Ocotillo, Population, Salinity, Temperature, *Texas, Water stress, Hydrogen ion concentra-

Ocotillo had no dormany requirements, and germinated equally well in light or darkness. Optimu constant temperature was 20-25 degree C, the limits being approximately 10 degrees and 40 degrees C. Ocotillo seeds germinated well to a water stress of -5.0 atm, but germination declined rapidly to -10.0 atm. Germination was best at pH 7.5, declined at 8.0, and was quite low at pH's 8.5 and 9.0 over the range tested. Ocotillo germinated well under saline conditions, the decline in germination with increasing salinity being attributable to the effects of water stress to 7080 ppm NaC1.--Copyright 1973, Biological Abstracts, Inc. W74-01591

LONGITUDINAL DISTRIBUTION AND HABITAT OF THE FISHES OF MASON CREEK, AN UPPER ROANOKE RIVER DRAINAGE TRIBUTARY, VIRGINIA, Roanoke Coll., Salem, Va. Dept. of Biology. R. E. Jenkins, and C. A. Freeman. Va J Sci. Vol 23, No 4, p 194-202. 1972, Illus. Identifiers: Drainage, *Fish habitats, *Longitudinal distribution, Rivers, *Virginia (Roanoke

Mason Creek is an Order 4 tributary of 15.0 miles in length within the upper Roanoke drainage, Virginia. Based on a total of 16 collections from 7 localities and on personal communications, its present ichthyofauna includes 40 spp. distributed among 7 families. The fauna is typical of that of the upper Roanoke drainage. Faunal diversity (number of species) increased regularly from the headwaters to the mouth, from 6 species at the uppermost station to 31 at the lowermost. The dominant trend was addition of species, rather than replacement, in the downstream direction. Most species showed a pattern of longitudinal zonation, disappearing in the upstream direction after apparently being continuously distributed, or they appeared only in the headwaters. Few species were collected at all stations. Thirty-two species were recorded in pools and 12 in riffles. Generally, only the larger individuals of typically pool-in-habiting forms were found in swifter waters, and the young of species whose adults are riffle fishes frequented quieter waters.--Copyright 1973, Biological Abstracts, Inc. W74-01592

POPULATION BIOMASS, NUMBER OF IN-DIVIDUALS, AVERAGE INDIVIDUAL WEIGHT, AND THE LINEAR SURPLUS PRODUCTION MODEL, Environmental Protection Agency, Gulf Breeze,

Fla. Gulf Breeze Lab.

A. L. Jensen

I Fish Res Board Can. Vol 29, No 11, p 1651-1655. 1972, Illus.

Identifiers: *Biomass, *Linear surplus-produc-*Model studies, Population,

The identity Bt + NtWt, where Bt is the population biomass, Nt is the population size and Wt is the average individual weight for all ages, is applied to develop simultaneous equations for change in biomass, number of individuals, and average individual weight for the linear surplus-production equation. It is shown that equations for all 3 variables cannot be simultaneously logistic. The relation between logeNt and logeWt predicted by the linear surplus-production model is compared with observation of bluegill population densities and average weights estimated from 10 vr of cove roteonone sampling in 5 large TVA reservoirs. The fit of the model to the data is fairly good, but it ac-counts for only a small amount of the total varia-tion observed.--Copyright 1973, Biological Ab-W74-01593

ASSESSMENT OF TWO MESH SIZES FOR IN-TERPRETING LIFE CYCLES, STANDING CROP, AND PERCENTAGE COMPOSITION OF STREAM INSECTS,

Alberta Dept. of Lands and Forests, Edmonton. Fisheries Section.

A. Zelt, and H. F. Clifford.

Freshwater Biol. Vol 2, No 3, p 259-269. 1972. Il-

Identifiers: Assessment, *Ephemeroptera, Life cyclers, *Mesh sizes, *Plecoptera, Sampling, Streams, *Aquatic insects, Standing crops.

Using Surber-type samplers and dip-net samplers. the efficiency of nets having pore sizes of 720 micrometer and 320 micrometer for determining standing crop and percentage composition of the stream fauna, and for collecting representative size-class specimens of Ephemeroptera and Plecoptera to be used in life-cycle studies was as sessed. Except for one species, samples collected with either the 720-micrometer or 320-micrometer dip-net led to the same general inferences about the species' life cycle. Of 50 possible sample comparisons, there were 12 samples where the sizeclass frequencies of particular species collected in the 720-micrometer dip-net were significantly dif-ferent from the size-class frequencies of the 320-

micrometer dip-net; for 5 of these samples deficit of large nymphs (> 5.0 mn) in the 320micrometer net mainly contributed to the signifi-cant x2 values. On one date, double-bag samplers with both the 720-micrometer and 320-micrometer nets attached to either the Surber or dip-net sampler were used. Approximately 50% of the insects by numbers passed through the 720-micrometer mesh of each sampler, but only 5% by volumebiomass. Shape of the insect as well as body length was important in assessing mesh-size efficiencies. The 720-micrometer mesh of the double-bag dipnet sampler retained most of the Nemoura cinctipes (having stout appendages) and Epeorus lon-gimanus (flattened) nymphs 2.0 mn in body length and larger; whereas most Baetis (streamlined) nymphs smaller than 3.0 mm and all Paraleuctra (needle-like shape) nymphs passed through the 720-micrometer mesh.--Copyright 1973, Biological Abstracts, Inc. W74-01601

THE RELATIONSHIP BETWEEN MAPLE CANKER INCIDENCE AND PRECIPITATION, Ohio Agricultural Research and Development Center, Wooster. Lab. of Environmental Studies. T. C. Weidensaul, and F. A. Wood.

Plant Dis Rep. Vol 56, No 11, p 942-943. 1972. Identifiers: Acer-Saccharum, Canker, *Fusarium-Spp, *Maple canker, Precipitation, *Pennsylvania.

The study was designed to determine whether, within the natural range of sugar maple (Acer saccharum) in Pennsylvania, levels of precipita-tion were correlated with canker (caused by Fusarium spp.) frequency. The difference in average yearly precipitation in Pike (106 cm) and edford (91 cm) counties was significant at the 0.01 level. An analysis of variance indicated a significant difference in canker frequency between the 2 counties based on a total of 2494 cankers observed. More cankers were observed in Pike County. There was variation in the number of cankers/tree within each county. A correlation analysis was made between the 2 counties with respect to precipitation vs. canker frequency. Although there were significant differences in precipitation and canker frequency, a coefficient of determination (r2) of less than 1% indicated that canker numbers and countywide precipitation were not associated when data from both counties were combined. The coefficients of determination in the 2 counties considered independently were both less than 1%, which also indicates that precipitation alone was not associated with canker frequency. Precipitation alone apparently does not have a significant influence on the frequency of cankers. When coupled with a satisfactory wounding agent and other unfavorable environmental condi however, precipitation may have an effect.--Copyright 1973, Biological Abstracts, Inc. W74-01602

SELECTED SPECIES OF ALGAE FOUND IN CARP PONDS OF THE LASKOWA COMPLEX NEAR ZATOR,

Instytut Zootechniki, Oswiecim (Poland). Zaklad

Doswiadczalnej Zator. T. Bednarz, and M. Nowak.

Acta Hydrobiol. Vol 14, No 1, p 103-112. 1972. Il-

Identifiers: *Algae, Bachycladon-Sp, *Carp ponds, Chlorangiopsis-Piriformis, Franceia-Elon-gata, Goniochloris-Fallax, Lambertia-Issajevii-Var-Spinosa, Lauterborniella-Appendiculata, *Po-land (Upper Vistula River), Ponds, Tetraedon-Cruciatum, Tetraedon-Proteiformae-Var-Granulatu, Tetraedon-Pussillum.

Notes are given on infrequent species of algae found during investigations on the plankton of carp ponds situated in the basin of the upper Vistala (Poland). Among the 30 listed, Goniochloris fallax (Heterokontae), Chlorangiopsis piriformis, Pachycladon sp., Lambertia issajevii var. spinosa,

Group 21-Water in Plants

Franceia elongata, Lauterborniella appendiculata, Tetraedron cruciatum, T. pussillum and T. proteiformae var. granulatum (Chlorococcales) are new for Poland.--Copyright 1973, Biological Ab-W74-01607

SOME INFLUENCES OF AQUATIC VEGETA-TION ON THE SPECIES AND NUMBER OF CU-LICIDAE (DIPTERA) IN SMALL POOLS OF WATER.

Auburn Univ., Ala. Dept. of Zoology-Entomology. B. M. Furlow, and K. L. Hays. Mosq News. Vol 32, No 4, p 595-599. 1972.

Identifiers: Aquatic plants, *Culicidae, *Diptera, *Spirodela-Oligorrhiza, *Mosquito population

Physical configuration of the aquatic vegetation in 10 ft diameter plastic pools in the southeastern United States appeared to influence qualitative parameters of mosquito populations. There were definite trends reflecting the association of particular Culicidae spp. with a particular type of aquatic plant: submerged, floating, emergent or none. Even though apparent quantitative differences were observed in culicid populations among the various types of vegetation, vegetation had no significant effect on population sizes. The floating plant, Spirodela oligorrhize (duck weed), had a detrimental effect on mosquito survival when it completely covered the surface of the water.--Copyright 1973, Biological Abstracts, Inc. W74-01609

WATER USE BY PERENNIAL EVERGREEN PLANT COMMUNITIES IN AUSTRALIA AND

PAPUA NEW GUINEA, Queensland Univ., Brisbane (Australia). Dept. of Botany.

For primary bibliographic entry see Field 02D. W74-01634

DISTRIBUTION PATTERNS AND POPULA-TION DYANMICS OF THE MICRO-TION DYANMICS OF THE MICRO-ARTHROPODS OF A DESERT SOIL IN SOUTHERN CALIFORNIA, Westfield Coll., London (England). Dept of Zoolo-

gy. J. A. Wallwork.

J. A. Wallwork.

Journal of Animal Ecology, Vol 41, No 2, p 291310, June 1972. 11 fig, 10 tab, 15 ref.

Descriptors: *Thermophilic animals, *Deserts, Arid lands, Population, Ecology, Soil environment, Microenvironment, *Distribution patterns, On-site investigations, Mites, Litter, Density, California, *Sierozems.

Identifiers: Joshua Tree National Monument, Mojave Desert, *Arthropods.

Very little information is availabe about the ecology of desert micro-arthropids, or about the way in which the various species populations are in-tegrated into a community system. This study was designed not only to identify the principal faunal components of a desert soil community, but also to investigate distribution patterns and population dynamics in relation to certain well-defined factors, such as temperature, moisture, shade and food supply. An account is given of the distribution patterns and population dynamics of the micro-arthropod fauna of juniper litter and under-lying mineral soil in the Joshua Tree National ument, Mojave Desert, California, based on samples taken regularly over a 90month period from October 1966 to June 1967. The bulk of the fauna consisted of mites mainly belonging to the Orders Cryptostigmata, Astigmata and Prostig-mata. The influence of shade on microdistribution patterns was examined but no significant effect could be detected. Peak densities for the entire fauna occurred in December and in April. The center of mite population densities shifts upwards from the mineral soil to litter as a new generation

of individuals is produced. The relationship between this upward extension of the population range and the density peaks occurring in the litter is discussed. (Black-Arizona) W74-01635

2J. Erosion and Sedimentation

W74-01121

MATHEMATICAL MODELING OF NUTRIENT

- TRANSPORT, Massachusetts Univ., Amherst. Water Resources Research Center. For primary bibliographic entry see Field 05B.

STRATIGRAPHY AND ECONOMIC GEOLOGY OF THE COASTAL PLAIN OF THE CENTRAL SAVANNAH RIVER AREA, GEORGIA,

Georgia Univ., Athens. Dept. of Geology. J. Sandy, R. E. Carver, and T. J. Crawford. Available from the National Technical Information Service as PB-225 151/0, \$4.00 in paper copy, \$1.45 in microfiche. Geological Society of America, Inc., Southeastern Section Guidebook for Field Trip No 3, April 16, 1966, 11 fig, 1 tab, 15 ref. OWRR A-006-GA (5).

Descriptors: *Stratigraphy, *Geology, *Economics, *Georgia, River basins, Geologic formations, Geologic time, Sedimentation, S mentology, Soil profiles, Exploration, Clay minerals, Sands, Gravels, Limestones, Marl, *Coastal plains.

Identifiers: *Savannah River (Geo).

The general stratigraphy and geologic setting of associated commercial clay deposits are illustrated for the coastal plain of the Central Savannah River area in central-east Georgia. Sites are distributed to show the stratigraphic position and mode of occurrence of kaolin, flint kaolin, fuller's earth, and speculities, as well as fossiliferous units of the Jackson Group of Eocene Age. The oldest forma-tion is the Tuscaloosa Formation, of early Upper Cretaceous age. It rests directly on the seawaterdipping, eroded surface of the igneous and metamorphic rocks of the Piedmont Province. The best exposures of both the Barnwell and Tuscaloosa Formations are in the deeper road cuts and open pit mines. Lenses of kaolin of commercial grade and size are found throughout the Tuscaloosa Formation, but appear to be larger and more numerous along a line from Richmond County to the point where McDuffie, Glascock, Warren, and Jefferson Counties join; extensive deposits of kaolin have been discovered in this area recently, and are being actively explored. (Woodard-USGS)
W74-01122

COHESIONLESS, FINE GRADED, FLAKED SEDIMENT TRANSPORT BY WATER,

Imperial Coll. of Science and Technology, London (England). Dept. of Civil Engineering. P. A. Mantz.

Nature Physical Science, Vol 246, No 149, p 14-16, November 5, 1973. 3 fig, 1 tab, 13 ref.

Descriptors: *Sediment transport, *Particle shape, Scour, Erosion, Suspension, Suspended load, Sedimentation

Transport of sediments composed of fine graded flakes was studied using six fine, well-sorted grades of muscovite and biotite mica flakes (specific gravity 2.74). The cohesionless nature of the flakes was established by measuring the angle of repose of part of a bed, after it had been laid down in a laboratory flume. This angle was fairly constant for all but the finest graded material. Each sediment bed composed of mica flakes was exposed to a very slowly increasing magnitude of applied fluid stress. A single mode of transport

was observed throughout, giving a bed form known as parting lineations (that is, long ridges, parallel to the flow direction, of grouped particles). During this transport, no suspended load was present. At a critical bed stress for each grade. the lineations began to oscillate in three dimensions. A difference in behavior was found between flakes and grains of the same fall diameter (this diameter is that of a sphere which has a specific gravity of 2.65, and the same fall velocity in still water as the particle). They have differing friction velocities for incipient motion. This gives one quantitative explanation for the geological concept of sediment bypassing (the selective transport of particles). The ratio of incipient suspension friction velocity to incipient motion friction veloicty is fairly constant at about 2.2. This contradicts the general supposition that fine graded sediment becomes suspended at a stress magnitude close to that of incipient motion. (Knapp-USGS) W74-01125

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF SALTATING SEDIMENTS ON KINEMATICS OF FLOW (EKSPERIMENTAL'-NOYE ISSLEDOVANIYE VLIYANIYA SAL'-TIRUYUSHCHIKH NANOSOV NA KINE-MATIKU POTOKA),

Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.

S. K. Olevinskaya, A. A. Pivovarov, and K. I. Rossinskiv.

Vodnyye Resursy, No 2, p 111-117, 1973. 7 fig, 9

Descriptors: *Sediment transport, *Saltation, *Flow, Turbulence, Turbulent flow, Movement, Sediment discharge, Flumes, Roug ness (Hydraulic), Froude number.

Identifiers: USSR, *Kinematics (Sediment trans-

Effects of movement of saltating particles on kinematics of turbulent flow on a hydraulically rough bed were investigated in flume experiments at the Hydrophysics Laboratory of the Department of Physics, Moscow State University. Gravels with particles ranging from 3 mm to 7 mm in diameter and with settling velocities between 26 and 30 cm/sec were used to investigate sediment movement. Interaction of sediment concentration and movement, and effect of sediment concentration on depth distribution of average flow velocities and pulsation intensity are examined, and relations of pulsation intensity to Froude number, sediment concentration in flow, and dynamic roughness are graphed. (Josefson-USGS) W74-01134

ENGINEERING CHARACTERISTICS OVERBURDEN IN KNOX COUNTY, TENNES-

Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C. W74-01143

OVERBURDEN RELATED TO TYPE OF BEDROCK AND ENGINEERING CHARAC-TERISTICS OF THE BEDROCK, KNOX COUN-TY, TENNESSEE,

Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C. W74-01144

SOIL ASSOCIATION MAP OF KNOX COUNTY, TENNESSEE.

Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C. W74-01146

Erosion and Sedimentation—Group 2J

SEDIMENTATION IN A MEANDERING ESTUA-

RY, Lehigh Univ., Bethlehem, Pa. Marine Science

For primary bibliographic entry see Field 02L.

BEACH CHANGES ON THE OUTER BANKS OF

NORTH CAROLINA, Virginia Univ., Charlottesville. For primary bibliographic entry see Field 02E.

BEACH CUSPS,

Louisiana State Univ., Baton Rouge. Coastal Stu-

R. J. Russell, and W. G. McIntire.

Geological Society of America Bulletin, Vol 76, p 307-320, March 1965. 5 fig, 7 plates, 6 ref, 2 ap-

Descriptors: *Beaches, Berms, *Sedimentation, *Coasts, *Waves (Water).
Identifiers: *Beach cusps, Sea states, Swash zone.

Beach cusps develop along seaward faces of growing berms. They appear early in the transitional period of decreasing wave energy from winter-to summer-beach conditions. Growth stages are described and related to currents within the swash zone. Cusp spacing depends on coastal exposure and state of the sea. Conditions under which cusps disappear are described. Although most steps in the depositional development and erosional removal of cusps are understood, the theory of their origin will remain incomplete until the reasons for their spacing are known in quatitative terms. (Sinha-OEIS) W74-01180

EFFECTS OF REEFS AND BOTTOM SLOPES ON WIND SET-UP IN SHALLOW WATER,

California Univ., Berkeley. Inst. of Engineering Research.

E. G. Tickner.

Corps of Engineers, Beach Erosion Board, Technical Memorandum No. 122, November 1960. 20 p, 12 fig, 1 tab, 5 ref.

Descriptors: *Coasts, *Reefs, *Slopes, Shallow water, *Wind tides, Waves (Water).

Wind tides in shallow water were studied in a laboratory channel with a reef, with various widths of openings, located near the center of the channel and with various slopes of the channel bottom other than horizontal. The reef increased the set-up over a smooth bottom condition by a factor of two for a solid reef and somewhat less than this if the reef had an opening in it. The crosssectional integration procedure adequately describes the surface profile for the sloping bottom, while the estimated set-up assuming a constant depth equal to the deepest part underestimates the actual set-up by as much as 2.75. (Sinha-OFIS) W74-01182

A PROFILE OF THE FOUR MOMENT MEA-SURES PERPENDICULAR TO A SHORE LINE, SOUTH HAVEN, MICHIGAN, Williams Coll., Williamstown, Mass.

For primary bibliographic entry see Field 02H. W74-01184

SEDIMENT TRANSPORT IN A COASTAL PLAIN ESTUARY, Virginia Inst. of Marine Science, Gloucester Point.

For primary bibliographic entry see Field 02L. W74-01185

SHIFTING OFFSHORE BARS AND HARBOR SHOALING.

United States Lake Survey, Detroit, Mich. L. Bajorunas, and D. B. Duane. Journal of Geophysical Research, Vol 72, No 24, p 6195-6205, December 15, 1967. 13 fig, 6 ref.

Descriptors: *Lake Superior, *Coasts, *Littoral drift, Erosion, Lakes, Harbors, Shoals, *Currents (Water), Shallow water, Sand bars. Identifiers: Ice foot, *Offshore bars.

Movement of offshore bars in Lake Superior produces alternating accretion and erosion of the nearshore area and causes pulsation in littoral drift. Extensive formation of ice foots contribute to significant erosion in front of them. Harbor structures extending into the lake shift offshore bars, modify coastal currents, and cause shoaling in the lee. The pattern of harbor shoaling was established, and its relationship with the shifting of offshore bars and existing currents was analyzed. The bar in shallow water was feeding material to the shoal and the currents determined the pattern of deposition. (Sinha-OEIS) W74-01191

LITTORAL ZONE TIDAL-CYCLE SEDIMEN-

Brooklyn Coll., N.Y. Dept. of Geology. M. L. Schwartz.

Journal of Sedimentary Petrology, Vol 37, No 2, p 677-683, June 1967. 3 fig, 4 tab, 5 ref.

Descriptors: *Sediment transport, *Beaches, Sands, Littoral, *Sedimentation, *Coasts, Shallow

Identifiers: *Tidal cycle.

A depth integrated fluorescent tracer procedure was developed in order to study the movement of individual sand grains along the beach profile. The following pattern of littoral zone tidal-cycle sedimentation was derived from the collected data: During flood tide a small portion of the sediment eroded in the lower backwash scour zone is deposited just seaward of the upper swash limit. It consists mainly of the finer grain sizes of the beach sand. Most of the eroded sediment, including a large part of the coarse grains, is deposited in the building of the step under the breaker zone. There is a slight diffusion of fine grains seaward of the step to the shoaling wave zone. Sediment moved landward with the advance of the breaker zone is concentrated at the step. Ebb tide sedimentation is similar, but two slight differences can be discerned. The fine sediment eroded as the lower backwash scour zone is translated seaward is deposited seaward of the upper swash limit; however, as it is being deposited in a former scour zone it serves to restore the beach profile to its original form. Then too, there is little net diffusion of fine sediment to the shoaling wavezone when the breaker zone has returned to its original lowtide position. In upper swash deposition and step deposition there is a reversal of the sediment relative to the vertical position it held in the scour zone. (Sinha-OEIS) W74-01192

SHORELINE PROCESSES NEAR BARROW, ALASKA: A COMPARISON OF THE NORMAL AND THE CATASTROPHIC, Tufts Univ., Medford, Mass. Dept. of Geology.

For primary bibliographic entry see Field 02L. W74-01193

THE EQUILIBRIUM BEACH,

Florida State Univ., Tallahassee. Dept. of Geolo-

Transactions, American Geophysical Union, Vol 39, No 5, p 889-891, October 1958. 6 ref.

Descriptors: *Beaches, Littoral drift, Sands, *Equilibrium, *Sedimentation, *Shore protection.

The equilibrium beach has curvature and sandprism characteristics adjusted to each other so delicately that the potential littoral motion provides precisely the energy needed to transport the detritus supplied at the up-current end. The time element in this balance is long-term rather than instantaneous. A beach which performs in any other way is not in equilibrium. The maintenance of certain beaches in equilibrium form is of great The most economic or political importance. pressing case of inequilibrium is that of the rapidly retrograding beach. In many instances the beach can be restored to an equilibrium condition by decreasing the actual littoral drift or increasing the available supply of sand. (Sinha-OEIS) W74-01195

BEACH EQUILIBRIUM AND SECOND-ORDER

WAVE THEORY, Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science. For primary bibliographic entry see Field 02E. W74-01201

LITTORAL PROCESSES AND THE DEVELOP-MENT OF SHORELINES,

Scripps Institution of Oceanography, La Jolla, Calif

D. L. Inman, and J. D. Frautschy.

In: Coastal Engineering Santa Barbara Specialty Conference, October 1965, American Society of Civil Engineers, p 511-536 (1966). 9 fig. 26 ref.

Descriptors: *Beaches, *Sediment transport, Littoral zone, Energy, *Circulation, *California, Inlets (Waterways).

Basic principles bearing on the nature of beaches and processes that act to modify them are considered in the light of present coastal development demands. A working hypothesis is developed that applies the principle of the conservation of mass to he mechanics of granular-fluid media. This hypothesis appears to have general application to sand transport processes in the littoral zone. Consideration is given to methods of providing sand sources and methods of decreasing the longshore transport rates of sand as well as to the creation of new beaches and shorelines. Additional research must be done to provide basic information in some critical areas before application can be made with assurance. (Sinha-OEIS) W74-01212

SAND MOVEMENT ALONG EQUILIBRIUM BEACHES NORTH OF SAN FRANCISCO, California Univ., Berkeley. Hydraulic Engineering

J. A. Cherry

Journal of Sedimentary Petrology, Vol 36, No 2, p 341-357, June 1966. 11 fig, 1 tab, 37 ref. NSF G-18123

Descriptors: *Sediment transport, *Coasts, *Beaches, *California, Currents (Water), Waves (Water), Equilibrium, Refraction (Water waves),

Identifiers: Swell, Heavy metals.

Many sandy shorelines along open coasts have relatively permanent configurations which often are the result of an equilibrium adjustment between the predominant swell waves, the predominant conditions of littoral sand movement and the rate of sand supply. The sand movement along several stretches of equilibrium shoreline near Point Reyes was studied using two methods: (1) common techniques of tracing heavy minerals and (2) theoretical predictions based on swell data and diagrams of wave travel in shallow water. Pat-terns of heavy mineral distribution in the beach

Group 2J-Erosion and Sedimentation

and offshore sands established that negligible net movement of sand occurs along the beaches and that no significant supply of sand is being added to the beaches at present. Analysis of the predomi-nant littoral and offshore waves showed that the sand transportation which was anticipated on the basis of predicted currents generated by the predominant swell coincides with that indicated by the heavy mineral patterns. (Sinha-OEIS) W74-01213

EROSION OF TIDAL FLATS NEAR GEOR-GETOWN, BRITISH GUIANA,

Geological Survey Dept., Georgetown (Guyana). D. D. Hawkes.

Nature, Vol 196, No 4850, p 128-130, October 13, 1962. 3 fig, 5 ref.

Descriptors: Mud flats, *Erosion, Deposition, *Intertidal areas, *Tidal effects, *Coasts, South America.

Identifiers: *British Guiana (Georgetown), *Tidal flats.

The British Guiana Coast is mainly an accretional coast which has been built up in recent times by the accumulation of mud flats. This deposition of mud is interrupted locally and temporarily by erosional periods. An erosion mechanism is described which is most effective in calm weather but in its cumulative effect is probably more important than storm weather erosion. An upper tidal and flat, which is covered by about a foot of water at high tide, is bounded by a low cliff step, below this a wide mud flat extends to the low water level. Blocks of dried-up clay fell from the step on to the soft mud below. Water swirling around these blocks removes loose mud from the edges and they sink deeper into the soft mud. Then turbulence in the water tends to rotate the blocks so that they cut out a pot hole in the mud which tends to grow larger and larger while the original mud block ecomes smaller and more spherical. Loose mud drilled out is carried away by the tidal motion of the water. The effect of this pothole drilling, which is most effective within 50 ft of the cliff step causes appreciable changes in the topography of the floor, even in a twelve hour intertidal period. W74-01216

THE EFFECT OF SAND DEPOSITION UPON THE MACRO-INVERTEBRATE FAUNA OF THE RIVER CAMEL, CORNWALL,

Cornwall River Authority, Launceston (England). For primary bibliographic entry see Field 02I.

A SIMPLE PORTABLE FIELD NEPHELOME-TER,

For primary bibliographic entry see Field 07B. W74-01247

THE OXYGEN STATUS OF LAKE SEDIMENTS, R. H. Howeier.

R. H. Howeier.

J Environ Qual, Vol 1, No 4, p 366-371, 1972, Illus. Identifiers: Lakes, Mathematical models, Minerals, *Oxygen, Sediments, *Lake sediments, Diffusion models.

The presence of O2 in the surface layer of sediments greatly affects the abundance and availability of Fe, Mn, nitrates, phosphates, and sulfates. The concentration of O2 in the oxidized layer depends on the balance between the rate of O2 diffusion into the sediment and the rate of consumption by the sediment. Several mathematical diffusion models were developed to describe this relation-ship between diffusion and consumption. With these models the flux of O2 across the water-mud interface and the thickness of the oxidized zone can be calculated. Experimental testing of the models showed that the steady state O2 consumption rates were proportional to the square root of the O2 concentration at the mud surface. The relative contribution of biological and chemical O2 consumption depended mainly on the organic matter content of the sediment, the biological consumption being highest in high-organic matter soils. Determination of the Fe distribution near the sediment surface showed that Fe diffused upward from the reduced soil and accumulated in the oxidized zone. This freshly precipitated Fe could function as a phosphate sink, absorbing phosphates from the water and storing it in the sediment .-- Copyright 1973, Biological Abstracts, W74-01266

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 4 AND 5. ST LAWRENCE RIVER BASIN AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS.

Geological Survey, Washington, D.C. For primary bibliographic entry see Field 02K. W74-01268

A ROLE OF SEDIMENT TRANSPORT IN AL-LUVIAL CHANNELS, Geological Survey, Washington, D.C.

T. Maddock, Jr.

ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10130, p 1915-1931, November 1973. 12 fig, 18 ref, append.

Descriptors: *Sediment transport, *Bed load, Alluvial channels, Scour, Sedimentation, Erosion, Suspended load, Velocity.

Once a critical amount of sediment is being moved in an alluvial channel, velocity can be expressed as a function of slope and of size and composition of the moving sediment load. Depth is a redundant parameter. At sediment transport rates below critical, depth is an effective parameter. Methods of determining the size and composition of the moving sediment load are analyzed as is the problem of determining when depth becomes redundant. The phenomena of fill and scour at alluvial channel sections is also considered. (Knapp-USGS)

ANALYSIS OF SEDIMENT SORTING IN ALLU-VIAL CHANNELS,

Colorado State Univ., Fort Collins, Dept. of Civil Engineering.

S. A. Rana, D. B. Simons, and K. Mahmood. ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10168, p 1967-1980, November 1973. 8 fig, 2 tab, 12 ref, append.

Descriptors: *Sediment sorting, *Alluvial channels, *Abrasion, *Sediment transport, Bed load, Mathematical models.

Bed material size in alluvial channels is reduced with distance downstream. This size reduction is caused by the physical size attrition of particles (abrasion) and by differential transport of sizes (sorting). A mathematical model is presented to simulate the bed material sorting in alluvial chan-nels. Application of this model to hypothetical channels shows that the sorting coefficient depends on the channel slope, regime of flow, and total bed material transport. Also, it is shown that in channels formed by aggradation of material transported from upstream, strict equilibrium is not possible in the absence of abrasion. (Knapp-(Pinell W74-01274

SEDIMENT TRANSPORT: NEW APPROACH AND ANALYSIS,

Hydraulics Research Station, Wallingford (England). P. Ackers, and W. R. White.

ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10167, p 2041-2060, November 1973. 4 fig. 2 tab, 22 ref, append.

Descriptors: *Sediment transport, *Bed load, Alluvial channels, Sedimentation, Suspended load, Particle size, Model studies.

The relationship of sediment transport to fluid flow was studied; physical reasoning leads to dimensionless groupings of the variables, which are different for coarse sediment and for fine sedi-ment because of dissimilar modes of transport. This concept provides a basis for a new analysis of data from flume experiments, and a method for dealing with transitional sizes of sediment is suggested. Analysis of experimental data supports the theory. Predictive equations relate total sediment flux to measurable properties of flow. A preliminary comparison was made with observations from other sources, including natural rivers. (Knapp-HSGS) W74-01279

TECHNIQUES FOR MEASURING LIGHT AB-SORPTION SCATTERING, AND PARTICLE CONCENTRATIONS IN WATER, Environmental Research Inst. of Michigan, Ann

For primary bibliographic entry see Field 07B. W74-01283

18-ISOPRENOID KETONE IN RECENT MARINE SEDIMENT, California Univ., Los Angeles. Inst. of Geophysics

and Planetary Physics.
For primary bibliographic entry see Field 05A. W74-01301

OBSERVATIONS OF NET SHORELINE POSI-TIONS AND APPROXIMATIONS OF BARRIER ISLAND SEDIMENT BUDGETS, Skidaway Inst. of Oceanography, Savannah, Ga.

For primary bibliographic entry see Field 02L. W74-01372

A METHOD OF FORECASTING THE BUILD-ING OF A RIVER BAR (METOD PROGNOZA PEREFORMIROVANIY RECHNOGO BARA), Moscow State Gemorphology. State Univ. (USSR). Chair

O. I. Samsonov. Vestnik Moskovskoga Universiteta, Seriya V, Geografiya, No 5, p 92-96, September-October 1971. 1 fig, 5 ref.

Descriptors: *Forecasting, *Deposition (Sediments), "Sediment transport, "Sediment discharge, "Flow, Turbulence, Mixing, Jets, Velocity, Channels, Streams, Shallow water, Equations.

Identifiers: USSR, *River bars.

A method is presented for forecasting the development of a river bar in a shallow-water area protected from the wind. To predict this process, a theory developed at the Moscow State University Department of Geomorphology on jet flow in a shallow offshore zone was used and applied to investigations in zones of turbulent mixing and maximum flow velocities. (Josefson-USGS) W74-01388

A STUDY OF THE EXCHANGE OF DISSOLVED SOLIDS BETWEEN BOTTOM SEDIMENTS AND WATER OF DIFFERENT WATER BODIES (IZUCHENIYE OBMENA RASTVORENNYMI VESHCHESTVAMI MEZHDU DONNYMI OT-LOZHENIYAMI I VODOY RAZLICHNYKH VODOYEMOV), Moscow State Univ. (USSR). Chair of Hydrology. M. V. Matrynova.

Vestnik Moskovskoga Universiteta, Seriya V, Geografiya, No 5, p 96-99, September-October 1971. 1 tab, 11 ref.

Descriptors: *Dissolved solids, *Sediment-water interfaces, *Bottom sediments, *Bodies of water, Lake sediments, Model studies, Estimating, Equa-Identifiers: USSR.

A quantitative estimate is made of the exchange of substances between bottom sediments and water to define the role of bottom sediments in the balance of biogenic elements in bodies of water. Research to determine the quantity of dissolved material released into water from bottom sediments is based on field observations of the distribution of an element on one or both sides of the sediment-water interface and on mathematical simulation. A study of the distribution of components on both sides of the sediment-water interface is, in all probability, the most correct approach to the study of the mechanism of exchange between water and bottom sediments. (Josefson-USGS) W74-01380

QUATERNARY SHORELINES OF THE SEAS OF OKHOTSK AND JAPAN (CHETVER-TICHNYYE BEREGOVYYE LINII OKHOT-SKOGO I YAPONSKOGO MOREY),

Akademiya Nauk SSSR, Novosibirsk. Dal-nevostochnyi Geologicheskii Institut. A. P. Kulakov.

Izdatel'stvo 'Nauka' Sibirskoye Otdeleniye, 1973. 188 p.

Descriptors: *Shores, *Oceans, *Ouaternary period, Pleistocene epoch, Littoral, Drowned (Submerged), Coasts, Continental margin, Continental shelf, Sea level, Geomorphology, Terraces (Geologic), Stratigraphy, Paleoclimatology, Palynology, Spores, Pollen, Sediments, Sedimentation Islands.

Identifiers: *USSR, *Sea of Okhotsk, *Sea of Japan, *Japan, Kamchatka, Kurile Islands, Sakhalin, Transgression (Stratigraphic), Paleogeography, Tectonics.

Geomorphological structure and development of shorelines in Quaternary time were investigated in studies conducted in 1963-70 on continental shores of the seas of Okhotsk and Japan (from Shelekhova Gulf in the north to Korea Strait in the south) and on the Kamchatka Peninsula, the Kurile and Japanese Islands, and the island of Sakhalin. Origin of marine terraces of island chains is analyzed, and problems of Quaternary geology and paleogeography are discussed. (Josefson-USGS) W74-01391

CHLORINATED HYDROCARBON INSECTI-CIDES IN SEDIMENTS OF SOUTHERN LAKE MICHIGAN, Illinois Univ., Urbana. Dept. of Civil Engineering.

For primary bibliographic entry see Field 05B. W74-01397

COUPLING CARBON FLOW THROUGH SOME PELAGIC AND BENTHIC COMMUNITIES, Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab. For primary bibliographic entry see Field 05B. W74-01437

MOHAWK LAKE STUDY, BRANTFORD, ON-TARIO.

Prepared for Grand River Conservation Authority, Cambridge, Ontario. August, 1972. 15p, 4 photos, 3 append. 6939-01. Descriptors: *Lakes, *Silting, *Reservoir silting, Sedimentation, Canada, Dredging, Excavation, Costs, Runoff, Spillways, Oxygen demand, Am-monia, Iron, Hydrogen sulfide, Methane. Identifiers: "Sediment removal, "Canada Mohawk Lake (Ont), Brantford (Ont), Grand River (Ont).

Mohawk Lake is a 35-acre lake in Brantford, Ontario. It is fed by the East Ward Creek, supplemented by a by-pass waterline from the Grand River. Because of an extremely low gradient, the river has silted, with deposits of 220,000 cu. yds. ranging from an average of 3 or 4 to 8 feet deep. Water depth is 8 to 10 feet on top of the sediments. The area surrounding the lake is proposed as a major recreation area, upon completion of an adjacent landfill. In order to establish and maintain recreational activities in the lake, primarily boating, the bottom sediments must be completely removed. This would lower oxygen demands, ammonia, iron, hydrogen sulfide, and methane concentrations. Unless the catch-basin at the head of the lake is extremely effective, the lake will soon silt again. Five alternative schemes for removal of sediment were initially considered and 3 are presented herein. One calls for silt removal by suction dredging. Advantages are least disruption to existing systems, but a liability is that this method does not result in a ''clean'' lake bottom. Two methods of open excavation are explained. One calls for pumping the lake dry, while another would use gravity to drain the lake into a retention pond and its outlets to the Grand River. Costs are estimated for each method. The gravity drainage and excavation alternative is recommended. Since peak runoff from the watershed is expected to increase 40%, contruction of a second emergency spillway to the Grand River is recommended to prevent flooding. Appendix contains maps and cost estimates. (Stein-North Carolina) W74-01476

OCCURRENCE AND CUMULATION OF MICROCOMPONENTS IN BOTTOM SEDI-MENTS OF DAM RESERVOIRS OF SOUTHERN POLAND,

Polish Academy of Sciences, Krakow. Zaklad Biologii Wod. For primary bibliographic entry see Field 05B. W74-01565

2K. Chemical Processes

HYDROLOGIC NUTRIENT CYCLE INTERAC-TIONS IN UNDISTURBED AND MANIPU-LATED ECOSYSTEMS (WATERSHEDS), New Mexico Univ., Albuquerque. Dept. of Biology. For primary bibliographic entry see Field 04C. W74-01110

EVALUATION OF FLAME EMISSION DETER-MINATION OF PHOSPHORUS IN WATER, Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab. For primary bibliographic entry see Field 05A. W74-01116

CHEMICAL RELATIONSHIPS BETWEEN SUR-FACE WATER AND THE GROUND IN SOUTH FLORIDA.

Miami Univ., Coral Gables, Fla. L. J. Greenfield, and C. R. Hare. Water Resources Bulletin, Vol 9, No 5, p 923-931, October 1973. 4 fig, 4 tab, 7 ref.

Descriptors: *Water chemistry, *Limestones, *Swamps, *Surface-groundwater relationships, Algae, *Florida, *Wetlands, Ion exchange, Acidity, Alkalinity, Hydrogen ion concentration, Peat, Mineralogy, *Cyanophyta. Chemical precipitation.

Analyses of soil and water were made in a stretch of shallow ground north of a cypress head in South Florida. The area is covered with water for part of the year, and it flows slowly southward. The soil is primarily peat formed from the local graminid vegetation during its decay. The top layer consists of a blue-green algal mat whose decay products contribute to the peat. Ion exchange capacity is high enough in all soil layers to account for the ion content within the soil and surrounding waters. It is a very important buffer system that retards limestone erosion. Cation exchange capacity (CEC) values ranged from 20 to 190 meg/100 gm dry soil from bedrock to surface. A large difference between the undersoils and the algal mat is based upon the fact that the synthetic processes are so great in the mat that at peak growth and on sunny days, pH may rise to 8.5.CaCO3, is often precipitated and contributes to the molluscan limestone deposits in this zone. Around tree islands, shading may occlude mat growth, and acidic decay products running off produce 'moats' in the rock. Subsequent filling of the area with peats and decaying mat fragments from upstream produce a layer with a high CEC that retards further erosion. (Knapp-USGS) W74-01153

THERMODYNAMICS OF ACID-BASE EQUILIBRIA. II. IONIZATION OF M- AND P-HYDROXYBENZOTRIFLUORIDE AND THE CONCEPT OF FLUORINE DOUBLE BOND-NO BOND RESONANCE, Georgia Inst. of Tech., Atlanta. School of Chemis-

C. L. Liotta, D. F. Smith, Jr., H. P. Hopkins, Jr., and K. A. Rhodes.

Journal of Physical Chemistry, Vol 76, No 13, p 1909-1912, 1972. 6 tab, 19 ref. OWRR B-049-GA (5). 14-31-0001-3269.

Descriptors: *Thermodynamics, equilibrium, Enthalpy, Entropy, *Ionization, *Fluorine, Water chemistry, Aqueous solutions, Chemical reactions, *Bonding, Identifiers: Calorimetric, *Hydroxybenzotrifluoride.

The free energy, enthalpy, and entropy of ionization of p- and m-hydroxybenzotrifluoride in water at 25C have been determined from pKa measure-ments as a function of temperature. The enthalpy of ionization was also determined by high-preci sion solution calorimetry. The thermodynamic data for the para and meta isomers are pKa 8.675, 8.950; delta H degree 4.99, 5.24 kcal/mol; and delta S degree -23.0, -23.3 cal/ (deg mole), respectively. The results suggest that double bond-no bond resonance is unimportant in the ionization of phydroxybenzotrifluoride.

EFFECT OF THE QUALITY OF WELL WATERS ON SOILS IN GURGAON DISTRICT, Haryana Agricultural Univ., Hisser (India). Dept. For primary bibliographic entry see Field 02G. W74-01252

'TRAPPED SEA-WATER' IN RORHOLTFJOR-DEN.

Oslo Univ. (Norway). Dept. of Limnology.

Schweiz Z Hydrol, Vol 34, No 1, p 34-40, 1972, Il-

Identifiers: *Norway (Rorholtfjorden), *Oxygen, Sea water (Trapped), Temperature, *Water sam-ples, Sampling, Hydrogen ion concentration.

On 25 Feb. 1971 some water samples were taken from Rorholtfjorden, Norway, to supply lake information, and if possible record changes in the water for the last 20 yr. The tables contain chemical data, pH, temperature and O2 content. The trapped seawater is also compared with original

Group 2K—Chemical Processes

seawater with the same chloride content. A socalled semitstagnation (Strom 1957) was not observed. It is possible that about 1 m of the trapped seawater was lost during the last 20 yr because of the removed semi-stagnation .-- Copyright 1973, Biological Abstracts, Inc. W74-01263

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 4 AND 5. ST LAWRENCE RIVER BASIN AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS. Geological Survey, Washington, D.C.

Available from GPO, Washington, DC 20402 -Price \$2.10 domestic postpaid or \$1.75 GPO Bookstore. Water-Supply Paper 2094, 1973. 293 p, 1 fig,

Descriptors: *Water quality, *Surface waters, *St. *Mississippi River basin, Lawrence River, *Chemical analysis, Tributaries, Sediment transport, Water temperature, Streamflow, Gaging stations, Flow rates, Basic data collections, Water analysis, Illinois, Indiana, Michigan, Minnesota, Missouri, New York, Ohio, South Dakota, Wisconsin

Identifiers: *Upper Mississippi River basin, *Hudson Bay basin.

The records of chemical analysis, water temperature, and suspended sediment of surface waters are tabulated for the St. Lawrence River Basin, and Hudson Bay and Upper Mississippi River Basins for the 1968 water year (Oct. 1967 to Nov. 1968). The Geological Survey maintained 139 stations on 93 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 81 of these locations for chemical-quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 59 and daily at 24 stations. Specific conductance was determined and reported for almost all daily samples. Quantities of suspended sediment are reported for 24 stations. Sediment samples were collected one or more times daily at most stations, depending on the rate of flow and changes in stage of the stream. Particle-size distributions of sediments were determined only at miscellaneous sites. Descriptive statements are given for each sampling station. These statements include location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most ta-bles of analyses. (Woodard-USGS) W74-01268

CONTRIBUTION TO PHYSICOCHEMICAL STUDY OF SOME SPRINGS OF THE GAPEAU RIVER BASIN (VAR), I Ollier

Bull Mens Soc Linn Lvon, Vol 41, No 3, p 41-48. 1972. Illus.

Identifiers: *France (Gapeau River basin), *Physicochemical studies, River basins, *Springs.

The physicochemical conditions (temperature, pH, chemical constituents, comparative ion ratios) of waters of some Gapeau river basin springs were briefly discussed based upon results of monthly samplings conducted from 1967-1968. The springs studied (Gapeau, Beaupre, Nai, la Servie, Thon, Font-Freye, Pignans) are characterized by their constant temperature (except for the Pignans spring which varies according to season), their alkaline pH (except for the Pignans which is acidic), and their ionic heterogeneity.--Copyright 1973, Biological Abstracts, Inc. W74-01288 STORAGE AND PROCESSING OF WATER QUALITY DATA,

Department of the Environment, Ottawa (Ontario). Inland Waters Branch. For primary bibliographic entry see Field 07C. W74-01293

APPLICATION OF INFRARED FOURIER TRANSFORM SPECTROSCOPY TO ANALYSIS OF MICRO SAMPLES,
Dow Chemical Co., Midland, Mich. Analytical

Lahs. S. S. King.

Journal of Agricultural and Food Chemistry, Vol 21, No 4, p 526-530, July/August 1973. 4 fig, 3 ref.

Descriptors: *Chemical analysis, *Pollutant identification, Organic compounds, *Sampling, Methodology.
Identifiers: *Microanalysis, *Infrared spectrosco-

py, Micro sampling techniques, Trace levels, In-

A Fourier transform mid-infrared spectrometer equipped with 6X bean condenser has been used to record infrared spectra of samples in submicrogram quantities. Emphasis was placed on a study of micro sampling techniques. Several techniques were tried to transfer micro quantities of samples from dilute solution to KBR substrate. The most efficient method found was to transfer a few microliters of the solution onto 0.1-0.4 mg of KBr powder by using a 10-microliter microsyringe. The solvent was evaporated slowly on the KBr powder, which was attached to the end of the syringe needle. The KBr powder was then pressed into a 0.5-mm diameter disk. Ir spectra of solutions were obtained by placing the samples in a special 1-mm path microcavity cell. All spectra recorded in this study were obtained at a resolution of 4/cm. By improving the sample handling techniques and by utilizing the advantages of the ft-ir spectrometer, it was found that the analysis of submicrogram quantities of samples by this method is practical. This setup is ideal for the identification of small particles which can be as small as 0.05 mm in diameter. If the sample is in dilute solution, it is possible to obtain a usable infrared spectrum of 0.05-microgram samples. (Holoman-Battelle)

EVALUATION OF THE USE OF THE HEATED GRAPHITE ATOMIZER FOR THE ROUTINE DETERMINATION OF TRACE METALS IN

State Univ., Coll., Fredonia, N.Y. Dept. of Geology. For primary bibliographic entry see Field 05A.

W74-01316

A COMPARISON OF FAST DESTRUCTION METHODS FOR THE DETERMINATION OF TRACE METALS IN BIOLOGICAL MATERI-

Brussels Univ. (England). Pharmaceutical Inst. For primary bibliographic entry see Field 05A. W74-01317

IMPROVED DISTILLATION METHOD FOR **VOLATILE ACIDS ANALYSIS,** Somerset Raritan Valley Sewerage, Somerville,

For primary bibliographic entry see Field 05A. W74-01322

LITERATURE ON MERCURY: AVAILABILITY OF ENGLISH TRANSLATIONS. Geological Survey, Menlo Park, Calif.

For primary bibliographic entry see Field 05A. W74-01323

CRITICAL STUDY OF THE APCD-MIBK EX-TRACTION SYSTEM FOR ATOMIC ABSORP-TION, Missouri Univ., Columbia. Dept. of Agricultural

Chemistry. For primary bibliographic entry see Field 05A. W74-01329

NOVEL METHOD OF RAMAN DATA ACQUISI-

Campinas Univ. (Brazil). Gleb Wataghin Inst. of

J. E. Moore, and L. M. Fraas Analytical Chemistry, Vol 45, No 12, p 2009-2014, October 1973. 6 fig, 14 ref.

Descriptors: *Methodology, *Organic com-pounds, Molecular structure, Data collections. Identifiers: *Raman spectroscopy, *Data acquisition, Enhancement, Selective phonon population, Data interpretation, Fluorescence discrimination, Resonant Raman enhancement.

Signal-to-noise information is presented that supports the feasibility of a novel approach to the acquisition of Raman data. In this approach, the fluorescence background interference common in many Raman experiments, is minimized through selective phonon population enhancement. The disadvantages of the proposed experimental technique are: a system must be constructed to comply with the experimental requirements and problems lying in the area of interpretation of acquired data. Although with simple organic molecules, a well known application of Raman data is in the use of vibrational analysis as a tool to accomplish structure elucidation, it may be im-possible to assign spectra of large molecules, because of their complexity, to fundamental modes. It will be possible in many cases with good spectra to identify functional groups. Resonant enhancement could be a means of compensating for the weaker scattering cross sections of resonance for biochemical samples. With modified experimental techniques, the acquisition of Raman data of large molecules is quite possible. (Holoman-Battelle) W74-01330

AUTOMATED RAPID SCAN INSTRUMENT FOR SPECTROELECTROCHEMISTRY IN THE VISIBLE REGION, Naval Research Lab., Washington, D.C. Elec-

trochemistry Branch. E. E. Wells, Jr.

Analytical Chemistry, Vol 45, No 12, p 2022-2026, October 1973. 4 fig, 1 tab, 15 ref.

Descriptors: *Chemical reactions, *Automatic control, *Monitoring, Computers, Spectrophotometry, Instrumentation, Laboratory equipment, Data processing.

Identifiers: *Scanning spectrophotometer, Nitrobenzene, Dimethyl sulfoxide, Sensitivity, Absorbance, Spectroelectrochemistry.

An instrument which uses a computer to control and collect data from a rapid scanning visible spec-trophotometer, and which simultaneously and operates a potentiostat to control generation of electrochemical intermediates is described. The 370-700 nm spectral range may be swept in as little as 5 msec, and by using real time control to zero the spectral background repetitive spectra may be signal averaged to give an ultimate sensitivity of 0.00001 absorbance unit. For peak monitoring at fixed wavelength, data may be taken as soon as 20 microseconds after the application of the reaction initiating potential step. The performance of the system is illustrated with results from millimolar solutions of nitrobenzene in dry dimethyl sulfoxide after stepping the potential into the limiting current region. (Little-Battelle) W74-01331 CHEMICAL CONSTANTS OF METAL COM-PLEXES FROM A COMPLEXOMETRIC TITRA-TION FOLLOWED WITH ANODIC STRIPPING VOLTAMMETRY.

Carolina Univ., Chapel Hill. School of Public Health.

For primary bibliographic entry see Field 05A. W74-01332

ANION RESPONSES AND POTENTIAL FUNC-TIONS FOR NEUTRAL CARRIER MEMBRANE

RELECTRODES,
North Carolina Univ., Chapel Hill. William R.
Kenan, Jr. Lab. of Chemistry.

J. H. Boles, and R. P. Buck. Analytical Chemistry, Vol 45, No 12, p 2057-2062, October 1973. 8 fig, 2 tab, 24 ref.

Descriptors: *Anions, *Electrochemistry, *Zeta potential, Physical properties, Aqueous solutions, *Electrolytes, Electrical properties, *Electrodes, Solubility, Oil, Equipment.

Identifiers: Potassium electrodes, Neutral carrier membrane electrodes, Response time, Ion selective electrodes, Picrates, Thiocyanates, tive electrodes, Picrates, Thiocyanates, Propionates, Cyclohexane butyrate, Benzene sulfonate, Benzoates, Potassium salts, Membrane electrodes, Ion pairing, Valinomycin electrodes.

Responses of Orion valinomycin-based, neutral carrier, potassium-selective electrodes have been measured for aqueous electrolytes containing oilsoluble anions. The results suggest a generaliza-tion of the Ciani-Eisenman-Szabo equation to include anion solubility, mobility, and ion pairing. This equation, which reduces to the CES form, en-compasses Nernstian response to cations or anions in extreme cases. A counter proposal using the Teorell-Myers-Sievers model is also developed. Both are consistent with limited potentiometric observations, although only the former predicts that a given membrane may be anion or cation responsive depending upon intrinsic anion or cation membrane solubilities. Preferential solubilization can be enforced by addition of solubilizing agents such as valinomycin to aid selective response. Conditions for reduced slopes and maxima in potentiometric response curves are discussed. In addition, a response function is derived following the fixed-site hypotheses of Kedem, Perry, and Bloch. Distinctions between the theories are not possible solely from potencation response measurements. (Holoman-Battelle) W74-01334

VERSATILE COMPUTER GENERATED VARI-ABLE ACCELERATING VOLTAGE CIRCUIT FOR MAGNETICALLY SCANNED MASS SPEC-TROMETERS. USE FOR ASSAYS IN THE PICO-GRAM RANGE AND FOR ASSAYS OF STABLE

ISOTOPE TRACERS, Washington Univ., St. Louis, Mo. Biomedical

Computer Lab.
W. F. Holmes, W. H. Holland, B. L. Shore, D. M.
Bier, and W. R. Sherman.

Analytical Chemistry, Vol 45, No 12, p 2063-2071, October 1973. 8 fig, 16 ref.

Descriptors: *Assay, *Organic compounds, *Chemical analysis, *Stable isotopes, Computers, Computer programs, Electronic equipment, Tracers, *Mass spectrometry, Spectrometers, Amino acids, Carbohydrates, Electrical equip-

Identifiers: *Trace levels, Magnetically scanned mass spectrometers, Accelerating voltage circuits, Precision, Sensitivity, Computer-D/A converter interface, Digital to analog converters, Myo-inositol, Alanine, Glucose, Accuracy, Circuits.

A circuit has been designed for magnetically scanned mass spectrometers that allows computer generation of any desired accelerating voltage change use to 2000 volts, using a 15-bit D/A con-verter, a high voltage amplifier, plus floating the standard accelerating voltage power supply. A 15bit D/A converter interface for use with PDP-81 and PDP-12 computers has been built from two logic modules. The circuit appears to have considerable application for upgrading existing magnetically scanned mass spectrometers where there is a need for increased sensitivity for measuring selected fragment ions or increased accuracy for isotope ratio measurements. Using this circuit, a program has been written for the PDP-12 computer that measures the intensities of eight fragment ions. Exact masses are typed into the computer and the appropriate accelerating voltages generated. Results are presented showing a linear assay for picogram levels of myo-inositol, and the precision of assays for deuterated alanine and glucose. (Holoman-Battelle) W74-01335

INVESTIGATION OF SPECTRAL OVERLAP OF THE NEON 359.352-NM AND CHROMIUM 359.349-NM SPECTRAL LINES IN ATOMIC AB-SORPTION AND ATOMIC FLUORESCENCE SPECTROMETRY OF CHROMIUM, Imperial Coll. of Science and Technology, London

(England). Dept. of Chemistry. J. D. Norris, and T. S. West.

Analytical Chemistry, Vol. 45, No 12, p 2148-2150, October 1973. 2 fig. 17 ref.

Descriptors: *Water analysis, *Aqueous solutions, *Chromium, *Metals, Laboratory equipment. Identifiers: *Atomic absorption spec-trophotometry, *Atomic fluorescence spectroscopy, Electrodeless discharge lamps, Neon lamps, Detection limits, Calibration curves.

Neon electrodeless discharge lamps (EDL) were prepared to study their usefulness in analyzing aqueous solutions of chromium by atomic fluorescence and atomic absorption. Power and emission intensity relationships showed that best results were obtained with lamps pressurized at 5 Torr and operated at 25-30 W incident power. Atomic fluorescence at 359 nm gave a detection limit of 2.5 ppm Cr using a monochromator slitwidth which corresponded to a spectral band-pass of 6 nm. The analytical curve was linear up to about 50 ppm. Atomic absorption at 359.3 nm gave a detection limit of 0.8 ppm. The analytical curve in the range of 1 to 250 ppm was slightly curved toward the concentration axis and passed through the origin. It is concluded that neon EDL's, because of the linearity of analytical curves produced, should be useful for fluorescence and atomic absorption of chromium even though detection limits are poorer than those obtained with chromium sources. (Little-Battelle) W74-01337

INDIRECT COULOMETRIC TITRATION OF BIOLOGICAL ELECTRON TRANSPORT COM-

PONENTS, Ohio State Univ., Columbus. Dept. of Chemistry. F. M. Hawkridge, and T. Kuwana. Analytical Chemistry, Vol 45, No 7, p 1021-1027, June 1973. 7 fig, 2 tab, 29 ref.

Descriptors: *Electrochemistry, *Energy transfer, *Cytological studies, Oxidation-reduction potential, *Volumetric analysis, Oxidation, Methodology, Chemical reactions.

lentifiers: *Electron transport, Coulometric titraition, Stoichiometry, Heme proteins, Bioener-getics, Enzyme kinetics, Potassium ferrocyanide, Methyl viologen, Myoglobin, 1 1'-Dimethyl-4 4'-bipyridyl dichloride, 1 1'-Ethylene-2 2'-bipyridyl dichloride, Optically transparent electrodes, Cytochrome c, Cytochromes.

The approach of utilizing an electrochemically generated titrant to transfer charge to an electron carrier enzyme has been demonstrated in the mediator/spinach ferredoxin-NADP-reductase/NADPH system. Present work describes further developments aimed toward the general application of spectroelectrochemical methods using optically transparent electrodes (OTE's) to evaluate the stoichiometry, energetics, and kinetics of enzymatic electron transfer sequences. Electrochemical and spectral data indicate that reagents such as potassium ferrocyanide, 1,1'dimethyl-4,4'-bipyridyl dichloride (methyl viologen), and 1,1'-ethylene-2,2'bipyridyl dichloride can also act as electron mediators and that their essential properties are unaffected by the presence of a protein. These reagents undergo electron transfer at the electrode and in turn transfer charge to the enzyme. Anaerobic redox titrations (O2 less than or equal to 0.5 microM) of horse heart cytochrome c, modified horse heart cytochrome c, and sperm whale myoglobin are reported. Results indicate that the n values of these eme proteins can be evaluated within plus or minus 3 percent of the expected values. Concurrent potentiometric data have also been obtained for certain titrations. Experimental details of cell design, oxygen removal by vacuum degassing, procedures in charge injection, and the rapid acquisition of spectral information are discussed. (Holoman-Battelle) W74-01338

SIMPLE INEXPENSIVE FREEZE-DRYING PROCEDURE, Bureau of Alcohol, Tobacco and Firearms, Cin-

cinnati, Ohio. For primary bibliographic entry see Field 07B. W74-01339

LATERAL DIFFUSION INTERFERENCES IN FLAME ATOMIC ABSORPTION AND EMIS-SION SPECTROMETRY,

Ames Lab., Iowa.
A. C. West, V. A. Fassel, and R. N. Kniseley. Analytical Chemistry, Vol 45, No 9, p 1586-1594, August 1973. 10 fig, 6 tab, 28 ref.

*Chemical analysis, Metals, Aluminum, Molybdenum, Cobalt, Calcium, Titanium, Potassium, Sodium, *Snectrophotometry.

Identifiers: Lateral diffusion interference, *Flame absorption, *Flame emission, Concomitants, Vanadium, Atomic absorption specrophotometry, Flame emission spectroscopy, Reproducibility, Silver, Tungsten, Chemical inter-ference, Sulfuric acid, Analytes.

Reported are results of detailed studies on the effect of concomitants on Al, Mo, and V absorption and emissions signals in nitrous oxide-acetylene flames supported on linear slot burners. Extensive unequivocal experimental evidence is presented to show that the horizontal distribution of the analyte free atoms across a linear slot burner flame may be markedly affected by the presence of concomi-tants. The effect of these concomitants, classified as a lateral diffusion interference, is to increase the concentration of analyte free atoms along the linear center of the flame and to decrease their concentration at the edges. This study of Al, Mo, and V confirms the existence of such enhance ments and attributes them predominantly to changes in the horizontal distribution of analyte free atoms or molecules across the flame profile. This redistribution was first observed by Koirtyohann and Pickett in 1968. Because the elements studies form stable monoxides, oxide formation at the edges of the flame due to entrained air ob-scures edge depressions accompanying the enhancements in the cent of unshielded flames. The interferences were therefore observed in an argon-shielded flame and confirmed in an unshielded flame with metals forming less stable oxides. The following mechanism is proposed to explain this type of interference: The concomitant delays in atomization of spray droplets or solid particles, thus shortening the time available for lateral diffusion in the flame by analyte atoms or

Group 2K—Chemical Processes

molecules before they reach the optical path. The analyte free atoms or molecules are therefore concentrated in the center of the flame and depleted at the edges. (Holoman-Battelle) W74-01342

NEW DETECTOR FOR ION-EXCHANGE CHROMATOGRAPHY,

Cincinnati Univ., Ohio. Dept. of Chemistry. For primary bibliographic entry see Field 05A. W74-01343

FLUOROMETRIC QUANTITATION OF GALLI-UM IN BIOLOGICAL MATERIALS AT NANO-GRAM LEVELS,

Research Triangle Inst., Durham, N.C. R. A. Zweidinger, L. Barnett, and C. G. Pitt. Analytical Chemistry, Vol 45, No 8, p 1563-1564, July 1973, 3 tab, 14 ref.

Descriptors: *Fluorometry, Separation techniques, Heavy metals.

Identifiers: *Biological samples, *Sample prepara-

Identifiers: *Biological samples, *Sample preparation, *Tissue, *Gallium, *Ion exchange chromatography, Recovery, Detection limits, Chemical interference, Acid digestion, Elution.

Samples of biological material were analyzed for gallium by anion exchange chromatography. Ascorbic acid reduction of Fe (III) was used after the chromatography, and the fluorometric reagent was Lumogallion. Samples were digested by boiling in sulfuric and nitric acid, treated with C104, diluted with water and HC1, the resulting solution applied to Dowex 1-X8 resin, and the Ga eluted with HC1. The eluted Ga was treated with ascorbic acid, Na2S203, and Na2C03, Lumogallion added, resulting complex extracted with isoamyl alcohol, and the fluorescence read at 570 nm with 490-nm excitation. The detection limit with mouse tissue was 15 ng/g with average recovery of 100 percent. Fe (II), Al, and Cu either did not interfere or their interference was eliminated by the W74-01344

PREVENTION OF SELENIUM INTERFERENCE WITH MEASUREMENT OF PHOSPHATE AS ITS MOLYBDENUM (V-VI) COMPLEX,

New South Wales Dept. of Agriculture, Rydalmere (Australia). Biological and Chemical Research Inst.

For primary bibliographic entry see Field 05A. W74-01345

SOLVENT EXTRACTION OF METAL 1,10-PHENANTHROLINE COMPLEXES AND CONCENTRATION OF TRACE AMOUNTS OF METAL IONS PRIOR TO SPECTROPHOTOMETRIC OR FLAME PHOTOMETRIC DETERMINATION,

Northern Illinois Univ., DeKalb. Dept. of Chemistry.

For primary bibliographic entry see Field 05A. W74-01354

SIMPLE DIRECT COMBINATION OF GAS CHROMATOGRAPHY AND VAPOR PHASE IN-FRARED SPECTROMETRY,

For primary bibliographic entry see Field 05A. W74-01355

DETERMINATION OF LOW CONCENTRA-TIONS OF COBALT IN PLANT MATERIAL BY ATOMIC ABSORPTION SPEC-TROPHOTOMETRY,

Western Australia Univ., Nedlands. Inst. of Agriculture.

W. J. Simmons.

Analytical Chemistry, Vol 45, No 11, p 1947-1949, September 1973. 3 tab, 11 ref. Descriptors: *Cobalt, *Plant tissues, *Pollutant identification, *Chemical analysis, *Methodology, Heavy metals, Potassium, Phosphorus, Calcium, Magnesium, Iron, Manganese, Zinc, Copper, Chemical degradation, Wheat, Clovers.

Identifiers: *Atomic absorption spectrophotometry, Chemical interference, Chemical recovery, Precision, Accuracy, Sample size, Organic solvents, 2-Nitroso-1-naphthol, Methyl isobutyle ketone, Sample preparation, Yellow lupin, Lucerne, Biological samples, Environmental samples.

An atomic absorption procedure is described which is an alternative to the AA method of Jago et al. (1971) for determining low concentrations of Co in plant material. This method has the same sensitivity but utilizes a different complexing agent (2-nitroso-1-naphthol), pH (6.0-6.4), and final solvent (MIBK) for the extraction and con-centration of Co. When Co-57 was added to four 5gamples of lucerne prior to digestion, recoveries of activity in the MIBK solution were quite satisfactory. The mean recovery was 98.8 percent with a standard deviation of 0.8 percent. The Effect of relatively high concentrations of eight of the most common of these elements on the determination of added Co was examined. None of the salts added interfered seriously with the recovery of added Co. Sample weight had no effect on the Co concentration of any of the plant materials analyzed indicating that the method is free of constant bias. The problem of nebulizer blockage encountered with another procedure was prevented by the removal of excess 2-nitroso-1-naphthol with NsOH. Over 1000 samples have been analyzed using the proposed procedure and not once has the nebulizer blocked. The method is superior to the colorimetric procedure because small sample weights can be used. For Co concentrations as low as 0.08 microgram/g, sample weights of as little as 2 have satisfactory precision and accuracy. At even lower Co concentrations, 5-g samples give adequate precision and accuracy. (Holoman-Bat-W74-01356

PRECOLUMN INLET SYSTEM FOR THE GAS CHROMATOGRAPHIC ANALYSIS OF TRACE QUANTITIES OF SHORT-CHAIN ALIPHATIC AMINES,

Agricultural Research Service, Fort Collins, Colo. For primary bibliographic entry see Field 05A. W74-01357

A SYSTEMATIC STUDY OF THE VARIABLES INVOLVED IN THE REVERSE-PHASE THIN-LAYER CHROMATOGRAPHY OF OXYETHY-LATED ALKYL SULFATE SURFACTANTS, Beaver Coll., Glenside, Pa.

For primary bibliographic entry see Field 05A. W74-01358

THE DETERMINATION OF LEAD AND NICKEL BY ATOMIC-ABSORPTION SPECTROMETRY WITH A FLAMELESS WIRE LOOP ATOMIZER,

Louisiana State Univ., New Orleans. Dept. of Chemistry.

For primary bibliographic entry see Field 05A. W74-01363

EXTRACTION-PHOTOMETRIC DETERMINA-TION OF URANIUM (IV) WITH CHLOROPHOSPHONAZO-III, Japan Atomic Energy Research Inst., Tokai. For primary bibliographic entry see Field 05A. W74-01364.

EVALUATION OF THE ACCURACY OF GRAN PLOTS BY MEANS OF COMPUTER CALCULA-TIONS. APPLICATION TO THE POTEN-TIOMETRIC TITRATION OF THE TOTAL AL- KALINITY AND CARBONATE CONTENT IN SEA WATER,

Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.

Chemistry.

I. Hansson, and D. Jagner.

Analytica Chimica Acta, Vol 65, No 2, p 363-373,

July 1973. 2 fig, 4 tab, 26 ref.

Descriptors: *Evaluation, *Computers, *Volumetric analysis, Sea water, Alkalinity, Carbonates, Mathematical studies, Water chemistry, Water quality, Equations.

quality, Equations.

Identifiers: 'Gran plots, 'Data interpretation, Accuracy, Potentiometric titration, Stability constants, Errors.

The use of computer calculations is deomonstrated for the determination of the systematic errors associated with Gran plots. The results of such calculations are used to derive 'modified' Gran plots capable of locating the equivalence point both more accurately and more precisely. The general principles are exemplified by application to the determination of the total alkalinity and carbonate content in seawater by means of potentiometric titration. (Holoman-Battelle) W74-01365

SEPARATION OF POLYPHOSPHATES BY PAPER CHROMATOGRAPHY WITH A NEW SOLVENT.

SOLVENT, Tennessee Valley Authority, Muscle Shoals, Ala. Div. of Chemical Development. For primary bibliographic entry see Field 05A.

W74-01366

A STUDY OF THE EXCHANGE OF DISSOLVED SOLIDS BETWEEN BOTTOM SEDIMENTS AND WATER OF DIFFERENT WATER BODIES (IZUCHENIYE OBMENA RASTVORENNYMI VESHCHESTVAMI MEZHDU DONNYMI OTLOZHENIYAMI I VODOY RAZLICHNYKH VODOYEMOV).

Moscow State Univ. (USSR). Chair of Hydrology. For primary bibliographic entry see Field 02J. W74-01389

CONCENTRATIONS OF DISSOLVED FORMS OF FE, MN, AND CU IN MARINE PORE WATERS OF THE ATLANTIC BASIN (KONTSENTRATSII RASTVORENNYKH FORM FE, MN, I CU V MORSKIKH, POROVYKH VODAKH BASSEYNA ATLANTICHESKOGO OKEANA).

Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.

Ve. M. Yemel'yanov, and N. B. Vlasenko. Geokhimiya, No 10, p 1268-1277, October 1972. 2 fig, 6 tab, 19 ref.

Descriptors: Geochemistry, *Dissolved solids, *Metals, *Pore water, *Atlantic Ocean, Sea water, Depth, *Iron, *Manganese, *Copper, Oxidation, Reduction (Chemical), Analytical techniques, Maps.

Identifiers: USSR, Oozes, Upwelling (Currents).

Concentrations of Fe, Mn, and Cu in waters of the Atlantic Ocean are lower than those in river waters. Surface waters of the sea contain 3 to 24 micrograms of reactive Fe per liter. Maximum concentrations occurred in waters along coasts, near river mouths and volcanic islands and in areas of deep upwelling. Minimum concentrations occurred along coasts of North America (Gulf Stream, Sargasso Sea). The content of organic (colloidal) Fe is 2-10 times that of the reactive form. The content of dissolved Mn in the upper layer of Atlantic waters varies between 0.5 and 32.0 micrograms/liter and in deep waters (25-5,000 m) is 0.5 to 12.0 microgram/liter. Maximum amounts occurred in shelf waters at the mouth of the Congo River, and minimum amounts were found in the 25-150 m active layer of the Angola

Chemical Processes—Group 2K

Depression. The content of Mn in pore waters varies between 27.5 and 1,500 micrograms/liter. Highest concentrations occurred in reduced muds of the Baltic Sea and off the Congo coast, and minimum concentrations were found in oxidized foraminiferal oozes on the mid-Atlantic Ridge. The content of Cu in surface waters of the sea varies between 0.5 and 10.3 micrograms/liter and the deep waters (50-5,000 m) is 1.5 to 7.0 micrograms/liter. Highest Cu concentrations (5 to 10.3 micrograms/liter) occurred in areas of upwelling. The Cu concentration in pore waters is quite high (12.0 to 110.0 micrograms/liter.0. concentrations of reactive Fe, Mn, and Cu vary slightly with depth, while the content of organic Fe increases at depths of 200-1,500 m or more. (Josefson-USGS) W74-01392

ISOTOPIC COMPOSITION OF OXYGEN AND HYDROGEN IN SULFIDE WATERS OF THE SOCHI-ADLER ARTESIAN BASIN (IZOTOPNYY SOSTAV KISLORODA I VODORADA SUL'FIDNYKH VOD SOCHI-ADLERSKOGO ARTEZIANSKOGO BASSEYNA), Moskovskii Geologorazvedochnyi Institut

(USSR).

L. V. Gorbushina, V. Ye. Vetshteyn, G. A. Malyuk, Ye. V. Iosifova, and R. R. Arutyunyants. Gelykhimiya, No 9, p 1102-1106, September 1972. 2 fig. 1 tab. 22 ref.

Descriptors: *Isotope studies, *Oxygen isotopes, *Deuterim, *Sulfides, Water types, Connate water, Sea water, Freshwater, Groundwater, Surface waters, Mass spectrometry.
Identifiers: *USSR (Krasnodar Territory), *USSR (Sochi-Adler artesian basin). Mineralization.

Isotopic composition of deuterium and oxygen-18 in groundwater and surface waters of the Sochi-Adler artesian basin in Krasnodar Territory was investigated to determine the origin of sulfide waters. According to results of isotopic determinations, sulfide waters of Jurassic deposits are connate sea waters, while waters of Cretaceous deposits are of mixed origin, containing between 64% and 91% freshwater. (Josefson-USGS) W74-01394

STATE OF RARE EARTH ELEMENTS IN SURFACE WATERS (O SOSTOYANII REDKOZEMEĽNYKH ELEMENTOV V POVERKHNOSTNYKH VODAKH), Akademiya Nauk SSSR, Moscow. Institut Geok-

himii i Analiticheskoi Khimii.

N. S. Zamokina.

Geokhimiya, No 9, p 1141-1146, September 1972. 4 fig, 1 tab, 15 ref.

Descriptors: *Geochemistry, Surface waters, Chemical reactions, *Analytical techniques, Spectrophotometry, Electrophoresis, Solubility, Fulvic acids, Hydrogen ion concentration, Stable isotopes, Radioisotopes, Radioactivity. Identifiers: *USSR (Moscow River), *Rare earth elements, *Cerium, *Yttrium, *Ytterbium.

Reaction of Ce, Y, Yb, and Ce-144 with fulvic acids separated from highly colored water of the Moscow River was investigated by solubility, spectrophotometric, and electrophoresis techniques. Reaction of rare earth elements with fulvic acids is accompanied by formation of slightly soluble compounds containing a fulvicacid fraction of high molecular weight and of soluble cationic and anionic complexes containing fulvicacid fractions of a lower molecular weight. Formation of complex compounds of rare earth elements with fulvic acids and their difference in solubility and stability are examined as possible factors affecting modes of migration, differentiation, and accumulation of rare earth elements in natural processes. (Josefson-USGS)

ISOTOPIC COMPOSITION OF HELIUM IN THERMAL SPRINGS OF ICELAND (IZOTOP-NYY SOSTAV GELIYA TERMAL'NYKH ISTOCHNIKOV ISLANDII),

Akademiya Nauk SSSR, Leningrad. Fiziko-Tekhnicheskii Institut.

B. A. Mamyrin, W. N. Bruce, and N. F. Shimp. Geokhimiya, No 11, p 1396, November 1972. 4 ref.

Descriptors: *Geochemistry, *Isotope studies, *Helium, *Thermal springs, Gases, Volcanoes. Identifiers: USSR, *Iceland.

A study was made of the isotopic composition of helium from a thermal spring in the northern volcanic rift zone of Iceland. The ratio of He-3:He-4 was 0.0000123 at a helium concentration of 0.0043 percent by volume. The wide ratio of He-3:He-4 for the volcanic zone of Iceland is similar to that obtained for the volcanic zone of the Kuril Islands and Kamchatka and is apparently typical of all volcanic regions on earth. (Josefson-USGS) W74-01396

FLUOROMETRIC DETERMINATION OF SELENIUM IN WATER WITH 2,3-DIAMINONAPHTHALENE,

New York State Dept. of Health, Albany. Div. of Lab., and Research.
For primary bibliographic entry see Field 05A.

For primary bibliographic entry see Field 05A. W74-01399

QUANTITATIVE ANALYSIS OF AQUEOUS NITRITE/NITRATE SOLUTIONS BY INFRARED INTERNAL REFLECTANCE SPECTROMETRY.

New York Univ., N.Y. Dept. of Chemistry. R. T. Yang, and M. J. D. Low.

Available from NTIS, Springfield, Va., 22151, as AD-755 750 for \$3.00 paper copy, \$1.45 microfiche. Analytical Chemistry, Vol 45, No 12, p 2014-2018, October 1973. 9 fig, 2 tab, 13 ref. (Technical Report No. 4, January 30, 1973. 23 p, 9 fig, 2 tab, 13 ref.)

Descriptors: *Aqueous solutions, *Nitrates, *Nitrites, Chemical analysis, Methodology. Identifiers: *Qunatitative analysis, *Infrared spectrometry, *Mixtures, Infrared spectra, Chemical concentration, Detection limits, Ammonium nitrite, Ammonium nitrite, Ammonium nitrite.

Infrared spectra of aqueous NO2 (-) and NO3 (-) solutions, and of binary mixtures, were recorded using internal reflection techniques and a Fourier transform spectrometer. NO2 (-) could be detected at a concentration of 0.02 M, and NO3 (-) at 0.001 M. However, NO3 (-) also became adsorbed on the Ge prism. After making corrections for NO3 (-) adsorption and for overlapping of NO2 (-) and NO3 (-) bands, it was possible to analyze binary mixtures with concentrations as low as (NO3 (-)) equals 0.03 M and (NO2 (-)) equals 0.05 M. By adjusting the optics so that the usually totally absorbing water stretching band had a transmittance of about 50 percent, it was possible to observe N-H and C-H stretching bands of solutes. Dissolved materials cause the water structure and consequently the water absorption to change, causing distortions of the background of atioed spectra of aqueous solutions. These distortions may influence qualitative and quantitative observations. (Holoman-Battelle) W74-01402

SIMPLIFIED SPECTROPHOTOMETRIC ANALYSIS OF PLANTS FOR SELENIUM,

South Dakota State Univ., Brookings. Dept. of Biochemistry.

Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1073-1077, September 1973. 2 fig, 3 tab, 7 ref.

Descriptors: *Spectrophotometry, *Plant tissues, Feeds, Hay, Grains (Crops).

Identifiers: *Biological samples, *Selenium, *Sample preparation, Detection limits, Recovery, Hair, Reproducibility.

Plant samples can be analyzed for selenium by a simplified spectrophotometric method based on light absorption at 378 nm of the piazselenol formed by the reaction of 2,3-diaminonaphthalene with selenite. Samples of wheat, corn, wheat bran, alfalfa hay, soybean oil meal, linseed oil meal, barley, Astragulus recemosus seeds, and A. bisulcatus leaves and stems were analyzed after digestion. Comparison of results with those obtained by fluorometric analysis, and reproducibility and recovery studies showed the method to be suitable for plant samples containing more than 2 ppm Se. It is also useful for analyzing feed premixes and in diagnosis of selenium poisoning in cattle by hair analysis. (Little-Battelle) W74-01406

CRITERIA FOR MYCOTOXIN STANDARDS, Food and Drug Administration, Washington, D.C. Div. of Chemistry and Physics. For primary bibliographic entry see Field 05A. W74-01414

RELIABILITY OF AN AMMONIA PROBE FOR ELECTROMETRIC DETERMINATION OF TOTAL AMMONIA NITROGEN IN FISH TANKS,

Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inti.
For primary bibliographic entry see Field 05A.
W74-01433

AN AUTOMATED METHOD FOR THE DERTEMINATION OF TRACE AMOUNTS OF METAL IONS BY ION-EXCHANGE CHROMATOGRAPHY. DETERMINATION OF ZINC (II) IN WATERS, Government Industrial Research Inst., Nagoya

(Japan).
For primary bibliographic entry see Field 05A.
W74-01438

THE DETERMINATION OF ORGANO-SULFUR COMPOUNDS BY THIN-LAYER CHROMATOGRAPHY VIA A LIGAND-EXCHANGE BDFCSS

PRECESS, Dalhousie Univ., Halifax (Nova Scotia). Trace Analysis Research Center.

For primary bibliographic entry see Field 05A. W74-01439

THE DETERMINATION OF CADMIUM BY ATOMIC ABSORPTION IN AIR, WATER, SEA WATER AND URINE WITH A R.F. CARBON BED ATOMIZER,

Louisiana State Univ., Baton Rouge. Dept. of Chemistry. For primary bibliographic entry see Field 05A. W74-01441

THE POTENTIOMETRIC TITRATION OF POTASSIUM IN SEA WATER WITH A VALINOMYCIN ELECTRODE, Goteborg Univ. (Sweden). Dept. of Analytical

Chemistry.
For primary bibliographic entry see Field 05A.
W74-01442

W74-01442
SMALL-VOLUME SOLID-ELECTRODE FLOW-

SMALL-VOLUME SOLID-ELECTRODE FLOWTHROUGH ELECTROCHEMICAL CELLS.
PRELIMINARY EVALUATION USING PULSE
POLAROGRAPHIC TECHNIQUES,
Hoffmann-La Roche, Inc., Nutley, N.J. Animal
Health Research.

For primary bibliographic entry see Field 07B. W74-01445

Group 2K—Chemical Processes

SOLUBLE ALUMINUM IN MARINE AND FRESH WATER BY GAS-LIQUID CHRO-MATOGRAPHY.

Alaska Univ., College. Inst. of Marine Science. For primary bibliographic entry see Field 05A. W74-01446

MICROBIAL CULTURE MEDIA PREPARA-

Western Australian Inst. of Tech., Perth. Dept. of Medical Technology. For primary bibliographic entry see Field 05A.

W74-01505

ION SELECTIVE SENSORS,

State Univ. of New York, Buffalo. Dept. of Chemistry. For primary bibliographic entry see Field 05A. W74-01506

DOUBLE PULSE COULOSTATICS,

Northern Illinois Univ., DeKalb. Dept. of Chemis-

P H Daum

Analytical Chemistry, Vol 45, No 13, p 2276-2278, November 1973. 2 fig. 1 tab, 20 ref.

Descriptors: *Chemical reactions, *Methodology, Electrochemistry, Resistance, Voltage regulations, Chemical analysis.

Identifiers: *Double pulse coulostatics, *Coulostatic analysis.

A two-step method avoids most problems due to double layer charging and solution resistance and thus allows the study of much faster chemical processes. The method involves the perturbation of the potential of the test electrode from a potential where no electrochemical reaction occurs to the diffusion limiting region with the application of a short duration coulombic pulse. The system is allowed to relax for a predetermined time tau and is then perturbed with a coulombic pulse of opposite sign, to the diffusion limiting region in the other direction. The ratio of the relaxation potential at time 2 tau, to that at time tau is determined, and from this and the value of tau, the rate of a coupled chemical reaction can be determined. The method can be recognized as the addition of a second pulse to the familiar method of coulostatic analysis and is similar to the methods developed by Sluyters et al. for the study of heterogeneous electrochemical processes. (Holoman-Battelle) W74-01511

GLASS-METAL COMPOSITE ELECTRODES, Louisiana State Univ., New Orleans. Dept. of Chemistry

G. G. Guilbault, G. J. Lubrano, and O. N. Gray. Analytical Chemistry, Vol 45, No 13, p 2255-2258, November 1973. 5 fig, 3 ref.

Descriptors: *Fabrication, *Zeta potential, *Electrical properties, *Electrodes, Instrumentation, Equipment, Construction, Physical properties, Durability, Costs.

Identifiers: Glass-metal composite electrodes, *Sensors, Platinum electrodes, Silver billet electrodes, Potentiometry, Cyclic voltammetry, Potentiometric titration

Some preliminary data are presented on an electrode system which utilizes a metal/glass com-posite carried as a film on a rigid inert glass carrier. Such electrodes have the advantages of durability, inertness to poisoners, and low cost. The conven tional electrodes used were Beckman 39273 platinum inlay electrodes and Beckman 39261 silver billet electrodes. The new type of sensors was prepared from a chemically pure, low alkali glass cut to sections 1/8-inch thick, 1 inch wide, and 4 inches long. Onto this substrate was screened a formulation composed of a noble metal powder and pure glass binder of low alkali content and of a fine particle size mixed in a fugitive binder. Examples of potentiometric titrations and cyclic voltammetric measurements show the possible usefulness of the new sensors as substitutes for the more costly billet, foil, or wire electrodes now commonly used in potentiometric measurements. (Holoman-Battelle) W74-01512

ION-ELECTRODE BASED AUTOMATIC GLU-COSE ANALYSIS SYSTEM, State Univ. of New York, Buffalo. Dept. of

Chemistry. For primary bibliographic entry see Field 05A. W74-01513

ANALYTICAL APPLICATIONS OF PULSED VOLTAMMETRIC STRIPPING AT THIN FILM MERCURY ELECTRODES, Colorado State Univ., Fort Collins. Dept. of

Chemistry. For primary bibliographic entry see Field 05A. W74-01514

NITROGEN/ARGON RATIOS BY DIFFERENCE THERMAL CONDUCTIVITY California Univ., Los Angeles. Inst. of Geophysics

and Planetary Physics.
For primary bibliographic entry see Field 05A.

W74-01522

A CHEMICAL SURVEY OF THE MALACCA RIVER.

Kempas Devon Estate, Malacca (Malaysia). Y. T. Tan, and G. A. Prowse. Malays Agric J. Vol 48, No 3, p 185-221. 1972, Il-

Identifiers: Chemical survey, *Malaysia (Malacca River), Minerals, Plankton, Rivers, Saline water, Sewage, Nitrates, Phosphates, Calcium, Sulfates.

A year long chemical survey was carried out over the length of the Malacca river, Malaysia. The tidal gate prevents both saline water and town sewage from passing upstream. Acid gelam swamps lower both the pH and the O2 of the water. Heavy rain washes nutrients downstream, but also lowers the O2 levels. Washing downstream tends to obscure changes in the various ions, although there are indications of the precipitation of Ca as sulphate. During drought nitrite appears to be oxidized to nitrate, while total phosphate levels are higher, probably due to the development of plankton.--Copyright 1973, Biological Abstracts, Inc.

2L. Estuaries

W74-01131

BIOCHEMISTRY OF ESTUARINE ECOSYSTEM WITH EMPHASIS ON HEAVY METALS AND SHELLFISH, Maryland Univ., College Park. Dept. of Chemis-

For primary bibliographic entry see Field 05C. W74-01108

HOLBROOK COVE SURVEY--A 1972 STUDENT SUMMER OCEAN ENGINEERING LABORATO-RY RESEARCH PROJECT. Massachusetts Inst. of Tech., Cambridge. For primary bibliographic entry see Field 05B.

INVESTIGATIONS ON THE INFLUENCE OF TIDES ON SALINITY, CONTENT OF SUSPENDED MATTER, SEDIMENTATION AND BACTERIA COUNTS IN THE ELBE ESTUARY, (UNTERSUCHUNGEN UBER DIE EINWIR-

KUNG DER TIDE AUF SALZGEHALT, SCHWEBSTOFFGEHALT, SEDIMENTATION UND BAKTERIENGEHALT IN DER UN-

Kiel Univ. (West Germany). Institut fuer Meereskunde.

P. H. Koske, H. Krumm, G. Rheinheimer, and K.

Kieler Meeresforschungen, Vol 22, No 1, p 47-63, 1966. 14 fig, 3 tab, 16 ref.

Descriptors: *Estuaries, *Bacteria, Sedimenta-tion, *Tides, *Salinity, *Sediment transport, Suspension, Path of pollutants. Identifiers: *Elbe estuary (Germany).

The hydrographic conditions in the zone of maximal suspended matter of the Elbe Estuary are described by continous records of transparency, currents, salinity, temperature, and by measurements of the content of particulate C and seston.

Investigations on mineralogical composition of suspended matter show no qualitative differences. But there are quantitative differences, obviously influenced by tidal transport sorting effects. With tidal variations of sedimentation and salinity, the distribution and composition of the bacterial flora are changing. (Sinha-OEIS) W74-01175

SEDIMENTATION IN A MEANDERING ESTUA-

RY, Lehigh Univ., Bethlehem, Pa. Marine Science Center.

L. S. Land, and J. H. Hoyt. Sedimentology, Vol 6, No 3, p 191-207, May 1966. 9 fig, 33 ref. NSF-G16426.

Descriptors: *Estuaries, *Sedimentation, Environments, *Coasts, *Georgia, Sand bars, Currents (Water). Sediments.

Identifiers: Bioclastics, Grain size, Point bar

Sand is being deposited in a meandering estuary separating Sapelo and Blackbeard Islands, Georgia, in the channel of the estuary and on two point bars associated with meanders. Sand is being eroded by the meandering channel from slightly lithified Pleistocene and unconsolidated Holocene strandline deposits, and is being redeposited by the ebb tidal currents. The estuary-channel deposits are coarse grained and their grain-size decreases down ebb current from the source outcrops. The point bars are elongated in the direction of the ebb current, and increase in grain-size from their crests downward as they grade into the channel deposits. Festoon cross-bedding and ripple marks on the point bars record the ebb direction, while elongate plant fragments are preferentially oriented normal to the bar elongation (current). Horizontally stratified muds and muddy sands are being deposited behind the bars, and contain a rich fauna (primarily annelids, arthropods, and mul-luscs). However, the fauna is represented in the deposits more by burrows and disturbed stratification than by preserved organisms. The sands of the bars and channel are biologically less productive, but the bioclastic content of the sediment is high. (Sinha-OEIS) W74-01177

STRUCTURE. ENTRAINMENT. TRANSPORT IN ESTUARINE EMBAYMENTS. Fisheries Research Board of Canada, Nanaimo (British Columbia). Pacific Oceanographic Group. J. P. Tully.

Journal of Marine Research, Vol 17, p 523-535, 1958. 4 fig, 14 ref.

Descriptors: *Estuaries, *Salinity, Mixing. *Tides, *Coasts, Entrainment, *Canada. Identifiers: *Halocine.

When fresh water enters the surface of an embayment it moves persistently seaward. Enroute it entrains seawater from below to form a halocline, in which the salinity increases with depth and to seaward. Wind mixing creates a nearly homogeneous zone in the upper part of the halocline. Below the halocline there is a nearly homogeneous lower zone in which sea water intrudes at a rate sufficient to supply the demand for entrainment. This fresh water transport system is superimposed on the tides which ebb and flood at all depths. There is a surface of no net motion in the halocline above which the net transport is seaward and below which it is inwards. Entrainment is the preferential upward transfer of water from the lower to upper zone. The downward mixing of fresh water is defined by the lower limit of the halocline, which is a surface of unidirectional upward transfer. The zone structure is accurately defined by plotting salinity as a function of the logarithm of depth. The seaward volume transport through the upper zone and halocline, the inward transport through the lower zone, and the upward transfer through the interzone boundary may be computed in terms of the continuity of fresh water, where the rate of input is known. Where it is not known, the equa-tions are solved by introducing the difference of dynamic height across the embayment. The features of structure and transport may be defined by application of normal oceanographic date. Sinha OEIS) W74-01178

SOUTH AMERICAN MARINE ENERGY,

Louisiana State Univ., Baton Rouge. Coastal Stu-

For primary bibliographic entry see Field 08A. W74-01181

THE UNION OF THE COLUMBIA RIVER AND THE PACIFIC OCEAN -- GENERAL FEA-

Washington Univ., Seattle. Dept. of Oceanography.

A. C. Duxbury.

In: Ocean Science and Ocean Engineering, Transactions 1st Conference Marine Technology Society, Washington, DC, June 1965, Vol 2, p 914-922, 1965, 6 fig. AEC AT (45-1)-1725, ONR Nonr-477 (10), 477 (37).

Descriptors: *Columbia River, *Precipitation (Atmospheric), Freshwater, *Seasonal, Effluent streams, *Winds, Upwelling, *Estuaries, Rivers, Watersheds (Basins), Environments, *Pacific Ocean.

The Columbia River is seasonal in its discharge, having both a winter and a summer peak. The winter peak is generally erratic and a function of the coastal precipitation, while the summer peak, produced by snow melt in the interior, is uniform The effluent enters the Northeastern Pacific through a belt of near uniform surface coastal water. In this region the Columbia is the largest single contributor of freshwater. During the summer peak discharge period the freshwater added by this one river represents approximately 95% of the area's coastal drainage. However, its influence on the dilution of the oceanic environment is reduced during the winter when other coastal rivers are also at peak flow. In addition to the seasonal variation in river flow, there is a seasonal trend in the transport of the effluent once it has united with the sea. During the winter the prevailing winds hold the effluent close to the shore on the northern side of the river, producing a narrow band of relatively fresh water that is composed of effluent from several coastal sources.
The summer brings persistent northerly winds which transport the river's discharge seaward to the southwest and on either side of the river. Since at this time of the year the freshwater in the oceanic environment adjacent to the river is nearly all Columbia River water, any modification of the

distributions can be related to the Columbia River and the local transport processes. (Sinha-OEIS)

SEDIMENT TRANSPORT IN A COASTAL PLAIN ESTUARY,
Virginia Inst. of Marine Science, Gloucester Point.

M. Nichols, and G. Poor.

Journal of the Waterways and Harbors Division. American Society of Civil Engineers, Vol 93, No WW4, Proceedings Paper 5571, p 83-95, November 1967. 9 fig, 19 ref.

Descriptors: *Sediment transport, *Estuaries, Density currents, *Tidal effects, *Shoals, Salinity, Diffusion, *Virginia, Turbulence.

Identifiers: *Rappahannock Estuary (Va), Flushing.

Observations of net flow and suspended sediment were made in the Rappahannock Estuary, Virginia, to delineate patterns of transport that lead to partial entrapment of sediment in the middle estua ry. The estuary is characteristic of the partly mixed type; its main channel is bordered by extensive submerged shoals. River-borne sediments are flushed downstream through the upper estuary mainly over the shoals. In the middle estuary, sediment is partly entrapped on the north shoals or deposited on the basin floor. Another part is redis-tributed headward in the channel along with estuarine produced organic constituents. Upstream transport by density currents is augmented by alternating tidal flow that favors differential settling and selective transport of coarse-grained particles. Near the head, rapid advective mixing and moderate tidal turbulence act to deter deposition and recirculate sediment downstream over the shoals. Engineering measures in similar systems should be planned to take advantage of natural self-flushing features. (Sinha-OEIS) W74-01185

ON THE SMALL-SCALE HORIZONTAL DIFFU-SION NEAR THE COAST,

Japan Atomic Energy Research Inst., Tokyo. For primary bibliographic entry see Field 05B. W74-01186

LONGSHORE CURRENT VELOCITY: A
REVIEW OF THEORY AND DATA,
Army Coastal Engineering Research Center,
Washington, D.C.

For primary bibliographic entry see Field 02E. W74-01187

TIDAL PERIOD OSCILLATIONS OF AN ISOHALINE SURFACE OFF THE MOUTH OF THE COLUMBIA RIVER, Washington Univ., Seattle. Dept. of Oceanog-

raphy. A. C. Duxbury, and N. B. McGary.

International Journal of Oceanology and Limnology, Vol 1, No 2, p 71-84, April 1967. 6 fig, 1 infold, 5 ref. ONR Nonr 477 (37), AEC AT- (45-1)1725.

Descriptors: *Columbia River. *Salinity. *Tides. Effluent streams, *Coasts, Hydraulics, Currents (Water), Winds, *Estuaries, Water properties. Identifiers: Tidal periods, *Isohaline surfaces.

Near the mouth of the Columbia River the river effluent forms a surface pool of low salinity water having distinct boundaries. The periodic motion of this pool and the magnitude of the accompanying changes in water characteristics have made it difficult to obtain directly quasi-synoptic measurements. To interpret these changes in both time and space, a repetitive series of observations was made, and depth-time profiles were interpolated for various parameters at selected points within this area of dilution. Vertical oscillations of equiscalar surfaces were found to be correlated with tidal periodicity. The variation in slope of the equiscalar surfaces with time along a three-station line was used in determining the motion of the periphery of the pool of low salinity surface water past the three stations. (Sinha-OEIS) W74-01188

NOTE ON THE EQUATIONS OF LONG WAVES OVER AN UNEVEN BOTTOM, National Engineering Science Co., Pasadena,

Calif.

For primary bibliographic entry see Field 02E. W74-01189

LITTORAL ZONE TIDAL-CYCLE SEDIMEN-

Brooklyn Coll., N.Y. Dept. of Geology. For primary bibliographic entry see Field 02J. W74-01192

SHORELINE PROCESSES NEAR BARROW, ALASKA: A COMPARISON OF THE NORMAL AND THE CATASTROPHIC,

Tufts Univ., Medford, Mass. Dept. of Geology.

J. D. Hume, and M. Schalk. Arctic, Vol 20, No 2, p 86-103, June 1967. 9 fig, 25

Descriptors: *Alaska, *Coasts, *Sediment transport, *Storms, Floods, Climates, Waves (Water), Beaches. Identifiers: *Point Barrow (Alaska).

Studies of sediment movement between 1948 and 1962 along the Alaska coast west of Point Barrow indicate a normal average yearly net transport to the northeast of 10,000 cubic yards. Net transport east of Point Barrow, based on surveys begun in 1958, indicate a normal annual southeastward movement there of 9,500 cubic yards. On 3 October 1963, a storm with gusts of up to 75 miles per hour blew over an ice-free ocean and attacked the coast. Wave heights, estimated at 10 feet, combined with a storm surge of 11 to 12 feet caused coastal flooding and over \$3 million damage. The 1963 storm, probably a 'two-hundred year storm,' moved over 200,000 cubic yards of sediments, which is equivalent to 20 years' normal transport. If the climate is becoming warmer, such storms can be expected more frequently. Construction adjoining the shore should be planned accordingly. (Sinha-OEIS) W74-01193

A STUDY OF TIDAL DISPERSION IN THE POTOMAC RIVER,
Federal Water Pollution Control Administration,

Annapolis, Md. Chesapeake Bay-Susquehans River Basin Project. For primary bibliographic entry see Field 05B. W74-01196

(Calif).

COMPUTER SIMULATION OF ESTUARIAL NETWORKS.

California Univ., Berkeley. Dept. of Civil En-

gineering. R. P. Shubinski, J. C. McCarty, and M. R. Lindorf. Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 91, No HY5, Proceedings paper 4470, p 33-49, September 1965. 6 fig, 15 ref, 1 append.

Descriptors: *Estuaries, Hydraulics, *California, Water transfer, *Salinity, Diffusion, Water quality, Model studies, Mixing, *Mathematical models, Path of pollutants. Identifiers: *Sacramento-San Joaquin River

The Sacramento-San Joaquin River Delta of California comprises approximately 700 mi of in-terconnected tidal channels that receive drainage

Group 2L—Estuaries

from the 64,000 sq-mi central valley basin. Waters flowing from the Delta paas through the San Francisco Bay system on their way to the Pacific Ocean. The development of a mathematical model that characterizes the dynamic tidal hydraulic conditions in the Delta network and its application to the prediction of water quality is described. The basic hydraulic conditions of surface water inflow, Delta consumptive uses, export demands, outflow, and tidal action are used as inputs to the model. A high speed digital computer program is described that will treat up to 1000 channel reaches interconnected at up to 750 junctions. Output gives values for input conditions, total head, velocity, surface width, and flow at selected points in both space and time. Other programs make possible salt routing on the basis of net flows and complete mixing. Limitations of this procedure are recognized and plans for the development of a dynamic water quality program are considered. (Sinha-OEIS) W74-01197

TIDAL CYCLE OF CHANGES IN AN EQUILIBRIUM BEACH, SANDY HOOK, NEW

Columbia Univ., New York.

A. N. Strahler. Journal of Geology, Vol 74, No 3, p 247-268, May 1966. 14 fig. ONR Nonr 266 68.

Descriptors: *New Jersey, *Beaches, *Coasts, *Sedimentation, Profiles. Identifiers: *Tidal cycles, Sandy Hook (NJ).

The purpose of the field study described was to determine the characteristic summer equilibrium profile form and composition of the Atlantic Ocean beach of Sandy Hook, New Jersey, and to determine in detail the minor cyclic fluctuations in profile and sediment compositon imposed by the semidiurnal tidal cycle. Reference grids were laid out on the beach at two field stations to provide horizontal and vertical control for profile lines surveved transverse to the shoreline in the foreshore zone. Surveys carried out during the summers of 1959, 1960, and 1961 provided data on the characteristic form and evolution of the beach during the summer regime of low waves and persistent obliquity of wave approach from the southeast. A series of half-hourly profile surveys permitted documentation of the small changes of beach form accompanying the rise and fall of tide and led to the formulation of a schematic model for the sequences of erosion and deposition in a semidiurnal tidal cycle. (Sinha-OEIS) W74-01198

EXPERIMENTS AND HYDROGRAPHIC SUR-VEYS OFF SANDY HOOK, NEW JERSEY

Lamont-Doherty Geological Observatory. Palisades, N.Y.

Technical Report No. CU-266 (48)-11 and Technical Report No. CU-2663-18, July 1965. 29 p, 9 fig, ref, 1 append. ONR Nonr 266 (48), AEC AT (30-1)2663

Descriptors: *New Jersey, *Dye concentrations, Descriptors: New Jersey, 276
Diffusion, Weather, Bays, Advection, *Hydrography, *Coasts, Turbulence, Energy.
Identifiers: *Sandy Hook (NJ).

Dve diffusion experiments carried out off Sandy Hook, New Jersey on August 7 and October 15 through 18 in 1963 are described. Aerial photographs from a low flying airplane in October experiments showed fine structures of dye patches, such as striations, owing to calm weather. A shipborne fluorometer indicated that dye was thinly spread vertically only above seven meters in Oc-tober although thermocline was located at about 25 meters. Hydrographic data off Sandy Hook Bay were collected at three different tidal stages on August 6 to 7. These data indicate that advection of water in the bay by tidal currents occurred independently at each level without much vertical mixing. Relationships between spectrum of mean square deviations of concentration and that of turbulent energy are discussed in relation to the dye diffusion process. (Sinha-OEIS) W74-01199

HARBOR ANALOG SYSTEM, PART I -

Navy Hydrographic Office, Washington, D.C. Oceanographic Analysis Div. A. L. Grabham.

Technical Report TR-117, August 1961. 33 p, 14 fig, 1 tab, 29 ref, 1 append.

Descriptors: *Harbors, *Waves (Water), Winds, Fetch, Seasonal, *Shallow water, *Estuaries.

An initial attempt is presented to classify harbors and nearshore areas into analogous groups with respect to the frequency distribution of wave heights and wave periods. The harbors and nearshore areas of the world are classified according to the wind regime, the maximum fetch length, and the prevailing wind direction in the primary fetch area with respect to the shoreline. Additional breakdowns provide for seasonal variations and varying degrees of sheltering. Wave height and period cumulative frequency distribution graphs have been compiled for each possible combination under the classification system. The graphs have been assembled from data averaged from studies of the U.S. Navy Hydrographic Office, and U.S. Beach Erosion Board, and from compilations of wave data tabulated from oceanographic decks of the National Weather Records Center of the U.S. Weather Bureau. Examples of the use of the graphs are provided as well as a brief description of other factors which affect waves in shallow water. (Sinha - OEIS) W74-01200

THE INFLUENCE OF TOPOGRAPHY AND PRESSURE GRADIENTS ON SHOALING IN A TIDAL ESTUARY

Leeds Univ. (England). Dept. of Mechanical Engineering. R. C. McGregor.

Geophysical Journal of the Royal Astronomical Society, Vol 25, No 5, p 469-480, December 1971. 4 fig, 1 tab, 11 ref.

Descriptors: *Estuaries, Tides, Equations, *River flow, Density currents, Topography, *Sedimentation, *Coasts.

Identifiers: *Shoaling, *Pressure gradients.

The non-periodic equations governing tidal motion in estuaries are developed. These equations, which determine the density driven currents within the estuary are then demonstrated to be easily soluble for estuaries of arbitrary topography, river flow and density distribution. The solution relates all the principal parameters associated with estuarial flow to the location of the deposition zone and can also be used to demonstrate the importance of different agencies in particular estuaries. The evaluation of the solution is very economical on computing time and requires only readily available data. Results are discussed with respect to data ap-propriate to the River Thames and the River Humber and agreement with observation is very good. (Sinha-OEIS) W74-01204

ON THE VERTICAL STRUCTURE OF TIDAL FLOW IN RIVER ESTUARIES, Reading Univ. (England). Dept. of Mathematics.

B. Johns, and N. Odd.

Geophysical Journal of the Royal Astronomical Society, Vol 12, No 5, p 103-110, November 1966. 1 fig, 1 tab, 6 ref, 1 append.

Descriptors: *Estuaries, *Tidal effects, *Rivers, *Currents (Water), Turbulence, Shear stress, Coasts. Identifiers: Humber River (U.K.), Shoaling, Eddy

A technique is developed for calculating the distribution with depth of current and shearing stress in tidal estuaries. The effect of turbulence is introduced by a coefficient of eddy viscosity which is a prescribed function of the depth coordinate, and the predictions are compared with observation and existing theory. Using parameters representative of the Humber estuary, the resultant current profiles are found to be in reasonable agreement with recent measurements. The friction coefficient k (used in the Lorentz linearization of the quadratic friction law) has a value consistent with that determined by the other methods. (Sinha-W74-01205

THE EQUATIONS OF CONTINUITY FOR SEA-WATER AND RIVER WATER IN ESTUARIES, Scripps Institution of Oceanography, La Jolla,

Calif. R. S. Arthur.

viscosity.

Journal of Marine Research, Vol 22, No 2, p 197-202, May 1964. 7 ref.

Descriptors: *Estuaries, *Mixing, *Diffusion, Sea water, Freshwater, Salinity. Identifiers: Turbulent diffusion, Conservation equations

Conservation equations for a mixture of fluids with two components are reviewed. Equations of continuity for sea (salt) water and for river (fresh) water in a turbulent mixing process in an estuary are developed. One source of error in certain similar equations in the literature is the omission of the turbulent diffusion flux. (Sinha-OEIS) W74-01207

THE GENERATION OF LONGSHORE CURRENTS ON A PLANE BEACH,

Liverpool Observatory and Tidal Inst., Birkenhead (England).

A. J. Bowen.

Journal of Marine Research, Vol 27, No 2, p 206-215, May 1969. 2 fig, 10 ref. NO0014-69-A-0200-6006.

Descriptors: *Beaches, Momentum transfer, Surf. Model studies, Shallow water, *Currents (Water), *Waves (Water).
Identifiers: *Longshore currents, Velocity field,

The generation of longshore currents on a beach is investigated theoretically, using the concept of radiation stress to describe the flux of momentum associated with the incoming waves. Outside the surf zone, the longshore gradient of the radiation stress is always zero, and the flow is therefore driven only inside the surf zone. The exact form of the longshore current is dependent on assumptions about both the behavior of the waves in the surf zone and the form of the viscous forces. However, with reasonable assumptions, the theory leads to a complete description of the velocity field as a function of the distance from the shore. The model is intended to provide a mathematical framework in which the various possible assumptions can be tested by comparing them with reliable experimental data. One of the laboratory experiments of Galvin and Eagleson (1965) is used to show the relevance of this approach. (Sinha-OEIS) W74-01208

THE CIRCULATION OF SURFACE WATERS IN

RALEIGH BAY, NORTH CAROLINA, Duke Univ., Durham, N.C. Dept. of Zoology; and Duke Univ., Beaufort, N.C. Marine Lab. I. E. Gray, and M. J. Cerame-Vivas.

Limnology and Oceanography, Vol 8, No 3, p 330-337, July 1963. 5 fig, 2 tab, 13 ref. NSF G-13,952 and G-25,128.

Descriptors: *North Carolina, *Surface waters, *Coasts, *Bays, Winds, Currents (Water), Water circulation, Topography, Drift bottles. Identifiers: *Raleigh Bay (N.C.).

Returns from helicopter-released drift bottles over Diamond Shoals, in April and August 1962, revealed a definite southwesterly coastal flow from Cape Hatteras, North Carolina. Influenced by northeast winds the flow was more pronounced in late summer than in late spring, some of the bot-tles rounding Cape Lookout. Recovery of drift bottles from Onslow Bay and Bogue Sound strongly supports the theory that the temporary winter populations of distinctly northern species in the Beaufort, North Carolina, area become established from planktonic larvae that originated north of Cape Hatteras and were transported around the capes. A postulated circulation, involving the influences of Diamond and Lookout shoals, runoff, northeasterly and southwesterly winds, and back eddies from the Florida Current and from wind-induced currents, is presented for Raleigh Bay. (Sinha-OEIS) W74-01210

TIDEWATER SHORELINES IN BROWARD AND PALM BEACH COUNTIES, FLORIDA: AN ANALYSIS OF CHARACTERISTICS AND CHANGES INTERPRETED FROM COLOR, COLOR INFRARED AND THERMAL AERIAL

Florida Atlantic Univ., Boca Raton. Remote Sensing and Interpretation Lab.

L. A. Eyre.

Available from NTIS as AD-727 630, Paper copy \$3.00, Microfiche \$1.45. Technical Report No 11 June 1971. 28 p, 17 fig, 1 tab. NO00-14-67-A-0320-

Descriptors: Coasts, *Shores, *Tidal waters, Color, *Aerial photography, *Remote sensing, *Florida.

Identifiers: Broward County (Fla), Palm Beach County (Fla), Infrared, Thermal aerial imagery, Imagery pattern analysis.

In South Florida, pressures to extend and modify tidewater shorelines are very strong. These modifications include canal excavations, dredging and filling, bulkheading, erection of sea walls, and dock construction. Access to tidewater is much coveted and competition for such access is keen. Using color infrared aerial photography flown at 5000 ft., eight types of tidal shorelines are distinguished in a portion of NASA Test Site 164. Comparisons are made with other imagery, including high-altitude (60,000 ft.) photography and that from the Reconafax and Bendix Thermal Infrared sensor systems; and the degree to which these shoreline types are observable is noted. Some changes over time are also indicated, in particular the extent of additional modifications during a period of approximately one year. (Sinha-OEIS) W74-01220

ESTUARINE CIRCULATION INDUCED BY DIF-

FUSION, National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs. D. V. Hansen, and M. Rattray, Jr.

Journal of Marine Research, Vol 30, No 3, p 281-294, September 15, 1972. 6 fig. 1 tab, 11 ref.

Descriptors: *Estuaries, *Stratification, *Diffusion, Salinity, *Chesapeake Bay, *Water circulation, Momentum transfer, *Maryland. Identifiers: *Baltimore Harbor (Md), Flushing, Bottom friction, Turbulent exchange.

Similarity solutions of the equations for estuarine circulation and salt balance are presented for a circulation generated by diffusive modification of stratification maintained at the entrance to an inlet by external dynamics rather than by fresh water discharged directly into the inlet. The explicit x dependence may be factored from the governing equations if the inlet geometry and longitudinal variation in turbulent exchange coefficients are expressible as power or exponential functions of distance along the inlet, and the ordinary dif-ferential equations so obtained are solved approximately by perturbation in a function of the Rayleigh number. Salinity in the model decreases inward along the bottom but increases inward along the surface of the inlet, and the flow is threelayered - inward at the top and bottom, outward at the mid-depth - as have been shown and inferred for Baltimore Harbor. Inclusion of bottom friction increases the salinity gradient along the bottom and decreases it along the surface, giving the salinity distribution some resemblance to that exnected in conventional estuaries. The induced circulation in all cases is a strong function of total depth and a weaker function of length and turbulent exchange coefficients for salt and momentum. The model can serve as an aid to interpretation of observations in this type of estuary, and it provides a simple means of evaluating the circulation and mixing rates from salinity measurements to whatever precision the eddy vicosity can be estimated, or current measurement can be obtained to scale the flow. (Sinha-OEIS) W74-01222

THE EFFECT OF MICROBIAL ACTIVITY UPON THE SEDIMENTARY SULPHUR CYCLE, University of the South Pacific, Suva (Fiji) For primary bibliographic entry see Field 05B. W74-01239

ZOOBENTHOS OF THE AZOV SEA AFTER THE CONTROL OF THE DON RIVER, (IN RUS-

SIAN), Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR). M. Ya. Nekrasova.

Zool Zh. Vol 51, No 6, p 789-797. 1972, Illus, (En-

glish summary).
Identifiers: *Benthos biomass, Biocenosis, Don River (USSR), Fauna, Food, Marine fauna, Nitrogen, Phosphorus, River control, *USSR (Azov Sea), *Zoo benthos.

After control of the Don River (USSR) flow, the amount of zoobenthic biocenoses in the Taganrog Bay diminished from 10 to 5. The benthos biomass in the western and central regions increased 2-3 times at the expense of introduction of marine fauna in the bay. In the eastern region, the biomass decreased by 40% at the expense of relict fauna. Two periods can be distinguished in the development of benthos in the Azov Sea after the control of flow. The first period (1952-1955) was characterized by ground compaction and the complete absence of suffocations, development of epifauna and depression of infauna on the background of unstable river regime. The Benthos biomass amounted to 210 g/m2 with 57% of food benthos. During the second period (1956-1970) the hydrological river regime stabilized and the concentration of N and P compounds markedly increased. The total benthos biomass amounted to 273 g/m2 with 70% of food benthos. The production of food zoobenthos in the Taganrog Bay varied in different yr from 243-644 thousand tons and in the Azov Sea from 19-196 million tons.— Copyright 1973, Biological Abstracts, Inc. W74-01257

RELATIONSHIPS BETWEEN TURBIDITY AND HYDROGRAPHICAL FACTORS IN FRESH AND BRACKISH WATER REGION OF THE ELBE ESTUARY, (IN GERMAN), For primary bibliographic entry see Field 05B. W74-01260

'TRAPPED SEA-WATER' IN RORHOLTFJOR-

Oslo Univ. (Norway). Dept. of Limnology. For primary bibliographic entry see Field 02K. W74-01263

SEDIMENT TRANSPORT: NEW APPROACH

Hydraulics Research Station, Wallingford (England). For primary bibliographic entry see Field 02J. W74-01279

OCEAN UTILIZATION AND COASTAL ZONE DEVELOPMENT.

Massachusetts Inst. of Tech., Cambridge.

Available from NTIS, Springfield, Va., 22151 as COM73-10417, Price \$3.00 printed copy; \$1.45 microfiche. Sea Grant Report No 73-3, 1973. 27 p. Sea Grant GH-88.

Descriptors: *Oceanography, *Estuaries, *Harbors, *Grants, *Water resources, Research Act, Colleges, Training, Projects, Navigation, Oil spills, Water pollution sources, Marine biology, Marine bacteria, Environmental control.

The Massachusetts Institute of Technology established its Institute-wide Sea Grant Program in July 1970 to execute the Coherent Area Project (CAP), 'Ocean Utilization and Coastal Zone Development,' using Grant Number GH-88 from the Office of Sea Grant, National Oceanic and Atmospheric Administration. OSG extended this grant for one year to June 30, 1972, at no addional cost to the grant. This extension means that additional studies and data are included in this report and complete, rather than interim, reports are provided on three of the first-year projects: research projects, education and training projects, and advisory services projects. The major emphasis for the 1970-71 program year was to organize an effective operation and to direct a viable pro-gram that emphasized the education and training and the research categories. These, with the advisory services, are explicit requirements of mature Sea Grant programs. Advisory service efforts included establishing a Marine Resources Reference Center, publishing and distributing reports, and organizing and implementing symposia and seminar meetings. (Woodard-USGS) W74-01281

WAVE-INDUCED WATER PARTICLE MOTION

MAYE-INDUCED WATER PARTICLE MOT MEASUREMENTS, Naval Postgraduate School, Monterey, Calif. For primary bibliographic entry see Field 02E. W74-01285

OXNARD BASIN EXPERIMENTAL EXTRAC-TION-TYPE BARRIER, California State Dept. of Water Resources, Sacra-

For primary bibliographic entry see Field 08B. W74-01289

INVENTORY AND EVALUATION OF INFOR-MATION ON DELAWARE BAY, VOLUME 2. Natural and Historic Resource Associates. Philadelphia, Pa.
Por primary bibliographic entry see Field 06E.
W74-01369

OBSERVATIONS OF NET SHORELINE POSI-TIONS AND APPROXIMATIONS OF BARRIER ISLAND SEDIMENT BUDGETS, Skidaway Inst. of Oceanography, Savannah, Ga.

Field 02-WATER CYCLE

Group 2L—Estuaries

Available from NTIS, Springfield, Va 22151, COM-73m10692 Price \$3.00 printed copy; \$1.45 microfiche. Georgia Marine Science Center Technical Report Series No 73-2, February 1973. 23 n. 6 fig. 3 ref.

Descriptors: *Sediment transport. *Barrier islands, *Coasts, *Georgia, Investigations, Aerial photography, Beaches, Littoral drift, Data collections, Evaluation, Beach erosion, Shore protection, Erosion control, Ocean currents, Tidal effects, Waves (Water). Identifiers: Shoreline changes (Georgia).

A short term history (30 years) of the barrierisland shoreline positions in Georgia was studied using aerial photographs. Distances of shoreline erosion and accretion were measured from transects established on sets of aerial photographs of barrier-island shorelines. Four sets of aerial photos were used in this part of the study. A 1933 set of aerial photos obtained from the Department of Commerce was used to establish transects on St. Catherines and Sapelo Island. The other barrier islands were not in this set. Complete sets for 1942. 1952 and 1965 were obtained from the Corps of Engineers, the Department of Agriculture, and the U.S. Coast Geodetic Survey. Although vertical photos for the 1970's were not available, oblique photos were taken from a small plane in March of 1972, and some geomorphic changes between the 1960's and 1970's were noted. The most obvious conclusion was that over a given interval of time there were no general trends that applied to the sediment budgets (net shoreline positions) of all barrier islands. Barriers and portions of barriers appeared to be undergoing sequential sedimentary and morphologic changes. (Woodard-USGS) W74-01372

PHYSIOLOGICAL ECOLOGY OF GELIDIELLA ACEROSA (FORSSKAL) FELDMANN ET

Saurashtra Univ., Rajkot, (India). Dept. of Biosciences.

For primary bibliographic entry see Field 05C. W74-01424

DIATOM ASSOCIATIONS IN YAQUINA ESTUARY, OREGON : A MULTIVARIATE

Oregon State Univ., Corvallis. Dept. of Botany. For primary bibliographic entry see Field 05B. W74-01430

GROWTH RATES OF INTERTIDAL MOL-LUSCS AS INDICATORS OF EFFECTS OF UNEXPECTED INCIDENTS OF POLLUTION, Fisheries Research Board of Canada, St. John's (Newfoundland). Biological Station. For primary bibliographic entry see Field 05C. W74-01434

PROBABLE CAUSES FOR THE 1972 RED TIDE IN THE CAPE ANN REGION OF THE GULF OF

New Hampshire Univ., Durham. Dept. of Botany. For primary bibliographic entry see Field 05C.

VIRGINIA NATURAL RESOURCES LAW AND THE NEW VIRGINIA WETLANDS ACT, D. J. Brion.

Washington and Lee Law Review, Vol 30, No 1, p 19-71, Spring 1973. 202 ref.

Descriptors: *Legislation, *Virginia, *Wetlands, Legal aspects, Coastal marshes, Local govern-ments, Tidal marshes, Swamps, Constitutional law, Aquatic habitats, Bodies of water, Land reclamation, Governmental interrelations, Water resources development.

When the Virginia General Assembly enacted a wetlands protection statue at its 1972 Session, Virginia became one of the last east coast states to enact laws protecting its valuable wetlands resources. Unlike other states, Virginia chose to place the primary authority and initiative for wetlands protection not in a state-level agency created for that purpose, but in its cities, counties, and towns. The act enables each Virginia locality containing defined wetlands to set up a local wetlands zoning board whose duty is to pass on all uses, with limited exceptions, of local wetlands. Although local board decisions are reviewable by a state marine resources agency and by the courts, the thrust of the act is to place the initiative for wetlands protection on the Virginia localities. The practical success of this act is yet to be demonstrated, but by its innovative structure it should be more successful than some of th W74-01448

PARTICULATE METALS IN WATERS OF SORFJORD WEST NORWAY, Edinburgh Univ. (Scotland). Grant Inst. of Geolo-

gy. For primary bibliographic entry see Field 05B. W74-01528

BOTTOM FAUNA AS AN INDICATOR OF WATER QUALITY IN SWEDEN'S LARGE LAKES (LAKES MALAREN, VATTERN AND

Uppsala Univ. (Sweden). Inst. of Zoology. For primary bibliographic entry see Field 05B. W74-01531

THE RELATIONS OF PERIPHYTIC AND PLANKTONIC ALGAL GROWTH IN AN ESTUARY TO HYDROGRAPHIC FACTORS, Washington Univ., Seattle. Dept. of Civil En-

gineering. For primary bibliographic entry see Field 05C. W74-01571

THE MANAGEMENT OF BAY AND ESTUARINE SYSTEMS IN THE TEXAS COASTAL ZONE, PHASE II. Texas Univ., Austin. Div. of Natural Resources and the Environment.

For primary bibliographic entry see Field 05G. W74-01620

VALUATION VISUAL-CULTURAL OF BENEFITS FROM FRESHWATER WETLANDS IN MASSACHUSETTS, Massachusetts Univ., Amherst. Dept. of Agricul-

tural and Food Economics. For primary bibliographic entry see Field 06B. W74-01643

SOME CONSEQUENCES OF AN INERTIA OF TURBULENCE IN A TIDAL ESTUARY, Reading Univ. (England). Dept. of Geophysics.

B. Johns. Geophysical Journal of the Royal Astronomical Society, Vol 18, No 1, p 65-72, September 1969. 3 fig, 6 ref.

Descriptors: *Estuaries, *Turbulence, Circula-tion, Energy dissipation, Tides, *Tidal effects. Identifiers: *Reynolds stress, Vertical gradient, Phase difference, Estuarine processes.

The changes that occur in an idealized estuary are considered in: the vertical structure of the tidal flow; the total mean rate of energy dissipation; and the tidal elevation at the head of the estuary. Having isolated the effect of a phase difference in a simple idealized estuary, the same conclusions may be expected to apply in a more general estuarial topography. A parametric representation of the turbulence in a tidal estuary is considered in which there is a specified phase difference between the Reynolds stress and vertical gradient of the tidal current. The model is used to estimate the dependence of the vertical and horizontal tidal structure on this phase difference. Calculations are also performed to determine changes in the mean rate of energy dissipation in the estuary. (Sinha-OEIS) W74-01648

OSCILLATIONS OF TIDE AND SURGE IN AN ESTUARY OF FINITE LENGTH. J. Proudman

Journal of Fluid Mechanics, Vol 2, No 4, p 371-382. June 1957. 3 ref.

Descriptors: *Estuaries, *Tides, *Surges, Meteorology, *Tidal effects, Mathematics, *Coasts. Identifiers: Surface elevation.

This paper is concerned with a narrow basin of uniform cross-section open to the sea at one end and closed at the other. An incident long wave of prescribed general form is supposed to enter from the sea and to represent the combination of tide and surge as generated in the sea. The solution of the linear terms of the equations of continuity and motion gives the reflection of this wave at the head of the estuary. The next approximation is given when the non-linear terms are retained, the second-order motion being made determinate by the condition that, at the mouth, it reduces to a progression towards the sea. The chief results relate to the surface elevation at the head of the estuary. When the first order elevation there increases steadily to a maximum, the effect of the shallow water terms' is to make high water higher and earlier, while the effect of the 'frictional term' is to make high water lower and later. For a short estuary, the interaction of the tide on a surge, due to a given sequence of meteorological conditions over the sea, is to make it higher when its maximum occurs at the time of tidal high water than when its maximum occurs at the time of tidal low water. This is directly opposite to the corresponding result when the estuary is of infinite length. W74-01649

LONGSHORE CURRENT GENERATION BY OBLIQUELY INCIDENT INTERNAL WAVES, Massachusetts Inst. of Tech., Cambridge. For primary bibliographic entry see Field 02E. W74-01650

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3B. Water Yield Improvement

POTENTIAL USEFULNESS OF ANTITRANS-PIRANTS FOR SOLUTION OF SOME WATER SUPPLY, PLANT GROWTH, AND ENVIRON-MENTAL PROBLEMS,

California Univ., Davis. Dept. of Water Science

and Engineering.
R. M. Hagan, and D. C. Davenport.

Available from the National Technical Informa-tion Service as PB-225 292/2, \$3.50 in paper copy, \$1.45 in microfiche. California Water Resources Center, Davis, Project Technical Completion Report (1970-1973), September 30, 1973. 60 p, 8 plates, 16 tab. OWRR A-035-CAL (1). 14-31-0001-

Descriptors: *Transpiration control, *Evapotranspiration control, Chemcontrol, Stomata, Water conservation, *Antitranspirants, Water supply, *Photosynthesis, *Phreatophytes, Fruit crops.

WATER SUPPLY AUGMENTATION AND CONSERVATION—Field 03

Conservation in Domestic and Municipal Use—Group 3D

Effects of film-forming antitranspirants on rates of transpiration and photosynthesis were evaluated by leaf chamber studies using dew-point hygrometer and infrared gas analyzer to monitor water vapor and carbon dioxide content of the air stream. Promising antitranspirant materials were evaluated as to foliar coverage with the aid of a scanning electron microscope, evaluated as to techniques of application, influence of stomatal conditions, plant-water potential and transmission of photosynthetically active wave lengths of light. Various antitranspirants were also field tested for possible use in highway landscaping, extension of life of cut flowers, aid in survival of transplants and cuttings, and improvement in fruit quality. Possible use of antitranspirants in reducing water loss by phreatophytes without destroying vegetation and ecological balance were also considered. (Snyder-California) W74-01105

DEVELOPMENT OF A TIME-SPACE PREDICTION TECHNIQUE TO EVALUATE SNOW-PACKS IN AND ADJACENT TO FOREST OPENINGS.

Arizona Univ., Tucson. Dept. of Watershed P. F. Ffolliott.

Project Completion Report, October 1973. 3 p. OWRR A-037-ARIZ (1). 14-31-0001-3803.

Descriptors: *Snowmelt, Runoff, Water supply, Forests, *Snow packs, *Arizona, Water sources, Water yield improvement.

Identifiers: New water supply, *Forest manage-ment guidelines, *Forest openings, Time-space prediction techniques.

In Arizona, snowpack water yield provides a major source of water for the reservoir systems, and it also contributes to the recharge of ground water aquifers. Much of the water realized is derived from the forest zone, which suggests the use of forest management practices (i.e., creating openings of different sizes, shapes, and orienta tions in forest overstories) in water yield improvement programs. Source information was obtained to develop a time-space prediction technique for evaluating and quantifying snowpack conditions in and adjacent to forest openings in terms of whether an increase in water equivalent occurred. And, if an increase was observed, the physical trade-off between the increased water equivalent and the decreased forest overstory was defined. This information is prerequisite to the synthesis and evaluation of water yield improvement programs based on forest management practices. W74-01231

GEOTHERMAL RESOURCE INVESTIGA-

Bureau of Reclamation, Boulder City, Nev. Region 3.

For primary bibliographic entry see Field 04B. W74-01273

ICEBERGS AS A FRESH-WATER SOURCE: AN APPRAISAL.

Cold Regions Research and Engineering Lab., Hanover, N. H.

For primary bibliographic entry see Field 02C. W74-01375

SIMULATION MODELS FOR -RESOURCE SYSTEMS: THEIR UTILITY IN MEASURING PHYSICAL AND ECONOMIC EF-FECTS OF WEATHER FORECASTING AND WEATHER MODIFICATION: SUMMARY RE-

PORT, North Carolina Univ., Chapel Hill. M. M. Hufschmidt, M. B. Fiering, and J. K. Sherwani.

In: Human Dimensions of the Atmosphere, Pt. 3, NSF 68-18, GPO, Washington, D.C., p 121-135, February, 1968.

Descriptors: *Water resources, Methodology, *Simulation analysis, *Weather modification, *Weather forecasting, Model studies. Identifiers: Harvard Water Resources Program,

Physical effects, Economic effects.

The feasibility of adapting water-resource system simulation techniques as a means for testing the physical and economic effects of weather management and forecasting on controlled water-resource systems is examined. Simulating behavior proceeds by: (1) assigning initial trial values to the decision variables; (2) operating the selected system over a selected period of time using the exogenous variables; and (3) observing the physical and economic response of the selected system. In order to adapt such a program to handle weather modification and forecasting situations changes would be needed with respect to: (1) exogenous data: essentially the historic precipitation and climatologic records; (2) synthetic precipitation generator, using historic precipitation records as inputs; (3) new exogenous data: information on the nature of modifications of precipitation; (4) precipitation-runoff model, translating precipitation data into runoff data; (5) streamflow-forecast model; (6) revised operating policy model, adapted to handle streamflow; (7) revised-economic evaluation sub-model, adapted to handle deficits under conditions of natural and modified precipitation, and conditions of streamflow forecasting and absence of forecasting. The necery subroutines are discussed, and it is concluded that it appears feasible to adapt water-resources system simulation programs of the Lehigh-Delaware type for use in testing the effectiveness of weather modification and streamflow forecasting measures. Additional research recommendations are suggested. (Edwards-North Carolina)

UNDERGROUND STORAGE OF TEXAS PLAYA LAKE WATERS BY INJECTION INTO THE OGALLALA FORMATION MODERATE PUMP PRESSURE. UNDER

Texas Tech Univ., Lubbock. For primary bibliographic entry see Field 04B. W74-01627

3C. Use of Water of Impaired Quality

THE ACTION OF MINERAL FERTILIZATION ON PASTURE HERBAGE, IRRIGATED WITH SEWAGE, (IN RUSSIAN),

Moskovskaya Selskokhozyaistvennaya Akademiya (USSR). For primary bibliographic entry see Field 05D.

IRRIGATION WATERS OF THE INDUS PLAINS AND THEIR SALT LOAD, Irrigation Research Council, Islamabad (Pakistan).

S. B. Hasan, and M. A. Hafeez Khan.

In: Cento Seminar on Agricultural Aspects of Arid and Semi-arid Zones, September 19-23, 1971, Tehran, Iran, Central Treaty Organization, p 278-295.7 tab.

Descriptors: Hydrologic data, Water levels, *Salts, Consumptive use, Water quality, Water resources, Groundwater basins, Seepage, Percolation, Saline water-freshwater interfaces, Arid lands, Irrigation effects, Soil water movement, *Salinity, *Irrigation water, Saline water, *Saline Identifiers: *West Pakistan (Indus Basin).

an Sea. The river waters used for irrigation in the Indus Plains are of high quality with a salt content of only 200-300 ppm. The quality of groundwater is variable, having three separate zones: the fresh water zone-less than 1,000 ppm total disolved salts (TDS); the marginal zone-1,000 to 2,000 ppm TDS; and the unusable saline zone-2,00 ppm TDS and over. Waterin the marginal zone can be used by mixing it with canal water. Seepage from the existing irrigation systems has built up a huge groundwater reservoir in the Indus Plains, and over the past 100 years the water table has been stedily rising. An appreciable upward movement of subsoil water by capillary action has resulted in considerable salt deposition through evaporation of soil water at the surface. Supplemental irrigation water is now required to depress the accumulated salts in addition to the consumptive use requrements of crops. Also, it is now necessary to raise the intensity of croppping in order to reduce evaporation from the soil surface and resultant salt build up. (Black-Arizona) 3D. Conservation in Domestic and

West Pakistan covers a land area of about 311,000 sq. mi. Summer temperatures are high, exceeding 120 F in the upper Sind. This region is divided into three distict hydrological units: the Indus Basin, the basin of the Kaharan Desert, and the Markran

coastal streams discharging directly into the Ara

Municipal Use

RECREATIONAL REUSE OF MUNICIPAL WASTEWATER, Texas Tech Univ., Lubbock. Water Resources

For primary bibliographic entry see Field 05D.

URBANIZATION AND ITS EFFECTS ON REGIMEN AND QUALITY OF SURFACE WATERS (URBANIZATSIYA I YEYE VLIYANIYE NA REZHIM I KACHESTVO POVERKINOSTNYKH VOD), Gosudarstvennyi Gidrologicheskii Institut, Lenin-

grad (USSR).
For primary bibliographic entry see Field 04C.
W74-01139

ENGINEER'S REPORT FOR SOUTH VALLEY WATER SYSTEM.

Herkenhoff (Gordon) and Associates, Albuquerque, N. Mex. For primary bibliographic entry see Field 06B. W74-01382

ARIZONA'S COMING DILEMMA: WATER SUPPLY AND POPULATION GROWTH, For primary bibliographic entry see Field 04A.

FUNCTIONAL WATER AND SEWERAGE PLAN AND PROGRAM.

LBC and W Associates, Columbia, S.C. For primary bibliographic entry see Field 05D. W74-01469

PROMOTING ENVIRONMENTAL QUALITY THROUGH URBAN PLANNING AND CON-TROLS.

North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies. For primary bibliographic entry see Field 05D. W74-01470

RELATING COMPREHENSIVE SEWER AND WATER PLANS TO THE COUNTY LAND USE PLAN. GOALS, POLICIES AND STANDARDS. Chenango County Planning Board, Norwich, N.Y.

Field 03—WATER SUPPLY AUGMENTATION AND CONSERVATION

Group 3D-Conservation in Domestic and Municipal Use

For primary bibliographic entry see Field 05D. W74-01473

COMPREHENSIVE WATER AND SEWER PLAN, RANDOLPH COUNTY, ILLINOIS. Southwestern Illinois Metropolitan Area Planning Commission, Collinsville. For primary bibliographic entry see Field 05D. W74-01474

STORM DRAINAGE AND FLOOD CONTROL FOR METROPOLITAN DENVER.

Denver Regional Council of Governments, Colo. For primary bibliographic entry see Field 04A W74-01475

TRI-AGENCIES PIPELINE: ENGINEERING RE-PORT.

San Diego County Water Authority, Calif. For primary bibliographic entry see Field 08A. W74-01477

REVIEW OF PLANNING FOR THE GRAND RIVER WATERSHED.

For primary bibliographic entry see Field 05D.

WATER MASTER PLAN. EUGENE-SPRIN-GFIELD URBANIZING AREA.

Edmundson, Kochendoerfer, and Kennedy, Portland, Oreg.; and Daniel, Mann, Johnson, and Mendenhall, Portland, Oreg.

Prepared for Lane Council of Governments, Eugene, Oregon. December, 1970. 114 p, 60 fig, 38 tab, 23 ref, 3 append. ORE. P-116.

*Water Descriptors: supply development. *Planning, *Regional development, Costs, Project planning, *Oregon, Treatment facilities. Identifiers: *Water system expansion, *Eugene-Springfield (Ore).

Population projections and commercial and industrial land use forecasts were used in conjunction with water use demands and related demand variations to determine future system requirements for both short-range (1975) needs and the long-range (1990) program. Projections were applied separately to the two elements within the study area: the central study area, including Eugene and Springfield; and the outlying communities. Because slow growth projections indicated that local demands of the outlying communities could be met (until 1990) by expansion of present systems, system development plans were concentrated on the central study area. Three alternative plans were evaluated for the central study area: (1) expansion of each of the present 9 utilities, (2) consolidation of utilities in the Springfield area, resulting in 2 area-wide utilities, and (3) the combination of all utilities into a single regional system. The third alternative was recommended. It offered the least capital cost, least cost in terms of construction programming (based on present worth analyses), and the least operation and maintenance expense. Besides interconnecting the existing system, the plan included the expansion of major water supply sources, particularly the Delta Treatment Plant, the installation of additional storage and pumping plants by the Airport and Willakenzie Reservoirs, and the construction of transmission and primary distribution mains. (Hoffman-North Carolina) W74-01479

UTILITY PROVISIONS ANALYSIS FOR EAST

CENTRAL FLORIDA. Reynolds, Smith and Hills, Jacksonville, Fla. For primary bibliographic entry see Field 06D. W74-01480

AVAILABILITY OF FRESH WATER IN THE EAST CENTRAL FLORIDA PLANNING RE-GION.

Aase (George) and Associates, Inc., Tallahassee,

For primary bibliographic entry see Field 06D. W74-01481

REPORT ON LAUREL CREEK CHANNEL IM-PROVEMENTS, WATERLOO BRIDGEPORT, ONTARIO.

Kilbom Engineering Ltd., Toronto (Ontario). For primary bibliographic entry see Field 04A. W74-01482

FLOODLAND AND SHORELAND DEVELOP-MENT GUIDE.

Southeastern Wisconsin Regional Planning Commission, Waukesha.

For primary bibliographic entry see Field 04A. W74-01483

A GROWING COMMUNITY: 1973 UPDATE, (LEXINGTON, KENTUCKY).
Lexington and Fayette County Planning Commis-

sion, Lexington, Ky.
For primary bibliographic entry see Field 05D. W74-01484

SKETCH DEVELOPMENT PLAN, CHAMBERS

COUNTY, ALABAMA. East Alabama Regional Planning and Development Commission, Anniston. For primary bibliographic entry see Field 05D. W74-01485

A LINEAR PROGRAMMING APPROACH TO FLOODPLAIN LAND USE PLANNING IN URBAN AREAS,

Arizona Univ., Tucson. Dept. of Agricultural Economics. J. C. Day.

American Journal of Agricultural Economics, Vol 55, No 2, p 165-174, May 1973. 1 fig, 3 tab, 22 ref, append.

Descriptors: *Flood plains, *Land use, *Planning, "Management, "Linear programming, Optimiza-tion, Economics, Floodproofing, Buildings, Con-straints, Systems analysis, Mathematical models. Identifiers: "Urban areas, Cost minimization, Sen-sitivity analysis, Land fill, Site elevation.

Floodplain land use management is an approach to flood loss prevention which will complement engineering works and lead to more efficient use and development of urban floodplain areas. A floodplain management plan combining land use through public administration and floodwater control through engineering works is subject to legal, political, administrative and technical difficulties. Needed is a methodology for deriving operating rules for the utilization of water and land resources. Land use management is structured as an optimization problem, using a recursive linear programming assignment model. The objective of the model is to identify the most economically efficient combination of spatial-temporal distribution of land use activities and employment of site elevation and floodproofing given a community's expected growth, land use goals, resource endow-ment, and existing flood risk. Sensitivity analysis is required because of possible nonlinearities. (Bell-Cornell) W74-01490

IMPACT OF IRRIGATION INVESTMENTS ON REGIONAL AND URBAN DEVELOPMENT, Resources for the Future, Inc., Washington, D.C. For primary bibliographic entry see Field 06B. W74-01625

3E. Conservation in Industry

WATER RESOURCES OF THE URAL AREA AND BASIC PROBLEMS IN THEIR COMPLEX USE (VODNYYE RESURSY URALA I OSNOV-NYYE PROBLEMY IKH KOMPLEKSNOGO ISPOL'ZOVANIYA), G. M. Ostrovskiy, O. V. Tyutkov, and A. M.

Chernyayev.

Vodnyye Resursy, No 2, p 118-124, 1973. 2 tab, 6

Descriptors: *Water resources, *Water utilization, Industrial plants, Water loss, Runoff, Water supply, Water types.
Identifiers: *USSR (Ural industrial area).

The Ural Industrial Area, which comprises the Sverdlovsk, Chelyabinsk, Perm', Kurgan, and Orenburg Oblasts, and the Bashkir and Udmurt Autonomous Soviet Socialist Republics, covers 824,000 sq km. Over 80% of the total water used in the area is obtained from rivers and lakes. Average annual streamflow is 127 cu km; in a low-water year of 95% probability, it is 71.1 cu km. The per capita input of water to the Ural Area is about 6,650 cu m/yr, decreasing to 3,520 cu m/yr in the Orenburg Oblast, to 1,900 cu m/yr in the Chelyabinsk Oblast, and to 920 cu m/yr in the Kurgan Oblast. Total water use is currently estimated at 11.6 cu km/yr (about 630 cu m per capita per yr), of which about 80% is industrial use, 17% is domestic use, and about 3% is agricultural use. Total water diversion is estimated at 9.4 cu km/yr. The present system of water use in the area does not ensure its protection from quantiative of qualitative depletion. (Josefson-USGS) W74-01135

3F. Conservation in Agriculture

POTENTIAL USEFULNESS OF ANTITRANS-PIRANTS FOR SOLUTION OF SOME WATER SUPPLY, PLANT GROWTH, AND ENVIRON-MENTAL PROBLEMS,

California Univ., Davis. Dept. of Water Science

and Engineering.
For primary bibliographic entry see Field 03B. W74-01105

AGRICULTURAL WATER DEMAND NORTH CAROLINA: PHASES I AND II, North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering. For primary bibliographic entry see Field 06D. W74-01112

RELATIONSHIP OF PUMPING LIFT TO ECONOMIC USE OF GROUNDWATER FOR IR-RIGATION.

Idaho Univ., Moscow. Dept. of Agricultural Engineering. For primary bibliographic entry see Field 04B. W74-01120

AGRICULTURE, FORESTRY, RANGE RESOURCES,

National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center. W. Crea.

In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md., March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 1-17, May 1973. 2 append.

Descriptors: *Mapping, *Surveys, *Satellites (Artificial), *Remote sensing, Land use, Soil surveys, Grasslands, Forests, Forestry, Crops, Data collections. Identifiers: *ERTS

WATER SUPPLY AUGMENTATION AND CONSERVATION—Field 03

Conservation in Agriculture—Group 3F

Results of remote sensing by ERTS approached or exceeded the 90% accuracy level for crop identifi-cation of major crops (corn and soybeans in South Dakota, Illinois, and Michigan; field corn and popcorn in Nebraska; winter wheat in Kansas; rice, safflower, asparagus, corn, and cotton in the San Joaquin Valley of California). Detection of field condition (growing crops, wet planted fields, plowed fields, harvested fields) was possible on fields as small as 4 hectares in the Imperial Valley on enlarged (1:62,500) color composites. Soft wood, mixedwood, hardwood, agricultural land, and water were successfully mapped using MSS Bands 5 and 7 and a dot grid to measure areas. ERTS-1 is well suited for broad to relatively specific vegetation classification and distribution and for monitoring changes in distribution and condition. Soil associations were delineated through the reflective characteristics of a fairly uniform cover of vegetation using computer analysis of output from a scanning microdensitormeter of MSS Band 7 imagery. (See also W74-01163) (Knapp-USGS) W74-01164

TWO HARVEST OF CEREAL CROPS PER YEAR WITH IRRIGATION, (IN RUSSIAN),

Dokl Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina. 10 p 8-10, 1971.

Identifiers: Barley, Buckwheat, *Cereal crops, Crop yield, *Harvests, Irrigation, Millet, Oats, *USSR (Crimea).

Summer sowings of barley, oats, millet, and buckwheat were tried on farms of the Crimea. A change of the meteorological conditions at various sowing dates had an effect on the photosynthesis of the plants, their productivity, and yield. It is possible to obtain a harvest of winter wheat or barey and to harvest buckwheat from the same fields in the same year .-- Copyright 1973, Biological Abstracts. Inc. W74-01202

EFFECT OF AN INCREASED WATER RATE IN LIQUID DRESSING ON SUGAR BEET VIELD.

Novocherkasskii Inzhenerno-Meliorativnyi Institut (USSR).

Dokl Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina. 10 p 43-45. 1971. Illus. Identifiers: *Sugar beet yield, Crop yield, Irriga-

tion, Soils, *Liquid-dressed plants.

The application of comparatively small quantities of water (up to 40 m3/ha) created favorable soil conditions for mobilization of soil resources, greatly improving the water supply of the liquid-dressed plants.—Copyright 1973, Biological Abstracts. Inc. W74-01211

WATER REGIME OF SUNFLOWER UNDER DIFFERENT CONDITIONS OF PHOSPHORUS NUTRITION, (IN RUSSIAN), Vsesoyuznyi Nauchno-Issledovatelskii Institut

Efiromaslichnykh Maslichnykh i Kultur. Krasnodar (USSR).

A. A. Borodulina, F. I. Ramazanov, and I. N. Terent'eva.

S-Kh Biol. Vol 7, No 2, p 250-255. 1972. Illus. (English summary). Identifiers: *Phosphorus fertilizers, *Sunflower,

Water regime, Fertilization

Sunflower yield greatly depends on the increased quantity of soil retained water at the stages of budding, flowering and grain formation. The activation of growth processes conditioned by the high content of mobile water results in a change in the ratio of reproductive and vegetative organs. The regulation of the water regime towards its optimization is achieved with increased rates of P fertilizers. When moisture is low, P fertilizers increase the water-holding capacity of cells, which, in turn, results in the maintenance of the water availability at a higher level than in unfertilized plants.—Copyright 1973, Biological Abstracts, Inc. W74-01227

EFFECTS OF SHADING AND OF SEASONAL DIFFERENCES IN WEATHERING ON THE GROWTH, SUGAR CONTENT AND SUGAR YIELD OF SUGAR BEET CROPS, Rothamsted Experimental Station, Harpenden

(England).

D. J. Watson, T. Motomatsu, K. Loach, and G. F. J. Milford.

Ann App Biol. Vol 71, No 2, p 159-185. 1972. Illus. Identifiers: Crop yield, Growth, Irrigation, Nitrogen, Seasonal, *Shading, *Sugar beet crops, *Weather conditions.

The weather in 1967 was sunny and dry and that in 1968 dull and wet, but the yields of dry matter, and particularly of sugar, of the unshaded crop in 2 yr were similar because although net assimilation rate (E) was greater in 1967 than 1968, mean leaf area index (L) in 1968 was almost double that in the 1967 crop. Shading decreased the incoming radiation by 56%; it decreased E proportionally in 1967, increasing L slightly, but it decreased both E (by 44%) and L in 1968. The weights of dry matter and sugar in the roots of the shaded crop were consistently smaller at the end of shading and at final harvest in Oct. in both years. Root weights at final harvest in all shading treatments were proportional to the amount of radiation between June and Sept. Although shading greatly decreased the supply of photosynthate to the roots, it did not change the sugar content percentage of dry matter, except in the early stages of growth when the sugar content rapidly increased. Sugar content percentage of fresh weight of the roots was consistently decreased by shading. The sugar yield of shaded plants was low because the dry weights of the roots were also low. In 1967, extra N applied at the start of shading increased L and the dry weight of the tops in all periods, but had no effect on the dry weight of the roots. Because 1968 was a wet year the irrigation treatment had no effect on E or L except for a slight increase in L during the first period; it had no effect on plant dry weight. Both irrigation and additional N decreased the sugar content percentage of fresh weight of the roots only by altering their water content; sugar percent-age of dry matter was unaffected.--Copyright 1973, Biological Abstracts, Inc. W74-01229

SOIL SALINIZATION UNDER IRRIGATED

CULTIVATION, Haryana Agricultural Univ., Hissar (India). Dept. of Agricultural Engineering.

Indian J Agric Sci. Vol 41, No 12, p 1073-1078.

Identifiers: Cultivation, Depletion, *Evapotrans-piration, Irrigated crops, Moisture, *Soil saliniza-tion, Transpiration, Salinity, *Root zone.

The accumulation of salts in the root zone depth under water cycles (irrigation and evapotranspiration) was analyzed. Assumptions such as linear depletion of moisture through root zone during evapotranspiration and positive displacement of soil water without mixing during leaching were made to simplify the problem for analysis. The resulting equations helped to predict the accumulation and distribution of salts in the root zone depth. The salt build up in the root zone during the growth season, where several irrigation-evapotranspiration cycles were involved, was ascertained .-- Copyright 1973, Biological Ab-W74-01238

THE EFFECT OF SUBSTRATE HUMIDITY ON THE SUPPLY OF MACROELEMENTS TO PLANTS, (IN LATVIAN),

Akademiya Nauk Latviiskoi SSR, Riga. Inst. of Biology. G. Rinkis.

Latv Psr Zinat Akad Vestis. 7 p 27-32. 1972, Illus,

(English summary).
Identifiers: *Elements, *Humidity, *Lettuce, *Spinach, Nitrogen, Potassium, Phosphorus, Calcium, Magnesium

Regularities of the influence of substrate humidity conditions on the assimilation of N, P, K, Ca, Mg, by lettuce and spinach plants were studied in 2 experiments. In the first experiment lettuce plants were cultivated at 5 gradations of the substrate constant humidity: 20%, 35%, 50%, 65%, 80% of the total humidity (TH). In the second experiment spinach plants at first were cultivated according to the same scheme, but on the 16th day the substrate humidity in variants was raised or lowered. In most cases a higher macroelement content was characteristic for lettuce and spinach plants, cultivated at the optimum substrate humidity (under the conditions of the experiment, from 50% to 60% TH). In variants with a high (80% TH) or slightly lowered humidity (35% TH) a lowering of macroelement content was observed. In variants with a low substrate humidity (20% TH) an increase in the macroelement content was observed.-Copyright 1973, Biological Abstracts, W74-01241

EFFECT OF FLOODING ON THE TWOSPOTTED SPIDER MITE AND ITS PREDATORS ON STRAWBERRY IN SOUTHERN CALIFORNIA, California Univ., Riverside. Citrus Research Center and Agricultural Experiment Station.

V. Voth Environ Entomol. Vol 1, No 6, p 717-720, 1972, Il-

Identifiers: *California, *Biocontrol, Flooding, Phytoseiulus-Persimilis, Predators, Scolothrips-Sexmaculatus, *Spider mites, *Strawberry, *Tetranychus-Urticae.

Biological control of Tetranychus urticae Koch on strawberry was investigated in southern California during 1968-69. Mass releases of Phytoseiulus persimilis Athias-Henriot were made at the equivalent rate of 86,250 total per acre at weekly intervals for 4 wk, starting Jan. 7. Populations of prey and predators were followed at weekly intervals from Dec.-June. A flash flood, resulting from a cloud-burst on Feb. 24, destroyed all but 2 replicates (1 check and I release) and covered all plants with water for several hours. T. urticae reached a peak population, averaging 508.1 and 484.2 mites/leaflet in the remaining check and release above. the remaining check and release plots, respectively, on April 22. By May 13, T. urticae averaged only 5.0/leaflet in the release plot compared with only 3.5/leaflet in the feleck. P. persimilis reached a peak population, averaging 22.1 mites/leaflet, in the release plot on May 6, compared with 3.0/leaflet in the check. Native predators (primarily Scolothrips sexmaculatus (Pergande)) were adversely affected by the flooding, remaining at low numbers through March 25 and reaching a peak of 0.5 predators/leaflet on May 27 .-- Copyright 1973, Biological Abstracts, Inc.

NITRATES IN SOIL AND GROUND WATER BENEATH IRRIGATED AND FERTILIZED CROPS.

Agricultural Research Service, Fresno, Calif. Soil and Water Conservation Research Div. H. I. Nightingale.

Soil Sci. Vol 114, No 4, p 300-311. 1972, Illus. Identifiers: *Fertilized crops, Grapes, *Irrigated crops, *Nitrates, Orchards, Pollution, *Soil water, Truck crops, Weeds.

Field 03-WATER SUPPLY AUGMENTATION AND CONSERVATION

Group 3F-Conservation in Agriculture

A field-scale approach and data reduction methods A field-scale approach and data reduction methods to evaluate associations between crop N fertilization rates, soil NO3--N concentrations, and ground water NO3--N within a meaningful size area are presented. The cumulative percentage frequency for soil NO3--N concentrations is presented for given soil depth intervals to 6.10 m under 4 crop classifications: no crops (weeds). grapes, row and truck crops. Geometric mean soil NO3--N concentrations depend upon the crop and soil depth, which suggests also a dependence upon soil N fertility management. Soil water content was dependent on soil texture, but was generally independent of the crop. Concentration of NO3-N at some sites in free, perched soil water was ap-parently related to N-fertilization. Orchards and row and truck crops were the major contributors to the higher concentrations of soil NO3--N. N-Fertilization rates of the various crops were re-lated to the observed levels of soil NO3--N, although relationship became less obvious with in-creasing depth. Soil NO3--N concentrations and variability are associated with types of crops and their N management practices. A positive correla-tion exists between N-fertilizer and NO3--N concentrations in the soil solution, but the projected concentration of NO3-N on the ground water is relatively low. Obviously, NO3-N will be lost below the root zone when applied far in excess of crop needs. Increasing N-fertilizer use efficiency to prevent excessive losses to the ground water is a worthwhile goal.--Copyright 1973, Biological Abstracts, Inc. W74-01245

EFFECT OF PUDDLING ON PHYSICAL PRO-PERTIES OF RICE SOIL,

Fertilizer Corp. of India, Sindri. Planning and

Development Div.
J. D. Naphade, and B. P. Ghildyal.

Indian J Agric Sci. Vol 41, No 12, p 1065-1067. 1972. Illus.

Identifiers: Aggregates, Hydraulic conductivity, *Puddling, *Rice soil, Size distribution, Specific volume, *Soil physical properties.

The physical properties of soil, such as the aggregate size distribution, apparent specific volume and hydraulic conductivity under different degrees of puddling, using a laboratory puddler, were stu-died to define the physical state of puddled soil. With the increased level of puddling, the dstribu-tion of finer particles increased owing to the breakdown of natural aggregates. Field puddle and puddling in laboratory due to 0.45 watt hr energy input broke down about 40% of soil aggreagates into fractions smaller than 0.055 mm in size. Puddling with an increased energy input of 0-2.700 watt hr decreased the apparent specific volume d hydraulic conductivity of the soil from 0.714-0.591 cm3/g and 0.192 cm/hr, respectively, and a significant correlation between these 2 properties was observed. The decrease in apparent specific volume and hydraulic conductivity of soil with an increased energy input by puddling was attributed to the reduction in non-capillary pore spaces and the closer packing of soil particles.--Copyright 1973, Biological Abstracts, Inc. W74-01246

SENSITIVITY OF CELL DIVISION AND CELL ELONGATION TO LOW WATER POTENTIALS IN SOYBEAN HYPOCOTYLS, Illinois Univ., Urbana. Dept. of Botany.

Illinois Univ., Urbana. Dept. of Botany.
R. F. Meyer, and J. S. Boyer.
Planta (Berl). Vol 108, No 1 p 77-87. 1972, Illus.
Identifiers: *Cell elongation, Growth, Hypocotyls,
Pressure, Sensitivity, Soils, Solute. *Soybean
hypocotyls, Transport, Turgor, Water potentials,
*Cell division, Osmosis.

The response of cell division and cell elongation to low cell water potentials was studied in etiolated, intact soybean hypocotyls desiccated either by withholding water from seedlings or by subjecting hypocotyls to pressure. Measurements of hypocotyl water potential and osmotic potential indicated that desiccation by withholding water resulted in osmotic adjustment of the hypocotyls so that turgor remained almost constant. The adjustment appeared to involve transport of solutes from the cotyledons to the hypocotyl and permitted growth of the seedlings at water potentials which would have been strongly inhibitory had ad-justment not occurred. Growth was ultimately inhibited in hypocotyls due to inhibition of cell division and cell elongation to a similar degree. The inhibition of cell elongation appeared to result from a change in the minimum turgor necessary for growth. On the other hand, when intact hypocotyls were exposed to pressure for 3 hr osmotic adjustment did not occur, turgor decreased, and the sensitivity of growth to low cell water potentials increased, presumably due to inhibition of cell elongation. Thus, although cell division was sensitive to low cell water potentials in soybean hypocotyls, cell elongation had either the same sensitivity or was more sensitive, depending on whether the tissue adjusted osmotically. Osmotic adjustment of hypocotyls may represent a mechanism for preserving growth in seedlings germinating in desiccated soil.—Copyright 1973, Biological Ab-W74-01249

CONSOLIDATION OF IRRIGATION SYSTEMS: PHASE 1, ENGINEERING, LEGAL, AND SOCIOLOGICAL CONSTRAINTS AND/OR

FACILITATORS, Colorado State Univ., Fort Collins. Dept. of

Agricultural Engineering.

V. Skogerboe, E. Radosevich, and C. Vlachos.

Available from the National Information Service Available from the National Information Service as PB-225 289/8, 88.75 in paper copy, \$1.45 in microfiche. Completion Report Series No. 52, Colorado Environmental Resources Center, Fort Collins, June 1973. 428 p. 45 fig, 76 tab, 496 ref, 3 append. OWRR-B-043-COLO.

Descriptors: *Irrigation systems, Prior appropriation, Agriculture, Arizona, Colorado, *Institu-tional constraints, *Irrigation districts, Irrigation water, *Legal aspects, Nevada, *Social aspects, Utah, Water management (Applied), Water policy,

The results from Phase I have indicated that consolidation of irrigation systems is a necessary part of an integrated policy of water development for improved water management, and of a coor-dinated effort towards an efficient and effective maximization of limited natural resources. National trends of growth, limited water supplies, the increasing population, and the multiplicity of uses call for new integrated forms of the interaction between policy determining institutions, local participants, and water users at large. W74-01367

SIMPLIFIED SPECTROPHOTOMETRIC ANAL-YSIS OF PLANTS FOR SELENIUM,

South Dakota State Univ., Brookings. Dept. of Biochemistry. For primary bibliographic entry see Field 02K. W74-01406

DETERMINATION OF MELEIC HYDRAZIDE RESIDUES IN TOBACCO AND VEGETABLES, Department of Agriculture, Ottawa (Ontario). Chemistry and Biology Research Inst. For primary bibliographic entry see Field 05A. W74-01418

MODEL FOR IRRIGATION PLANNING USING CHANCE CONSTRAINED PROGRAMMING AND HYDROLOGIC SIMU-

Norwegian Inst. of Urban and Regional Research, For primary bibliographic entry see Field 04B.

W74-01488

ECONOMICS OF RESOURCE USE ON SAMPLE FARMS OF CENTRAL GUJARAT,

Indian Inst. of Management, Ahmedabad. B. M. Desai.

Indian Journal of Agricultural Economics, Vol 28, No 1, p 71-85, Jan.-Mar. 1973. 4 tab, 9 ref, append.

Water resources, Descriptors: Descriptors: Water resources, *Irrigation, *Economic efficiency, *Return (Monetary), Agriculture, Crops, Returns to scale, Rainfall, Fertilizers, Labor. Irrigation water, Acreage, Mathematical models, Systems analysis.

Identifiers: *Production functions, *Resource use,

*India (Gujarat), Regression coefficients, Least

The production functions on sample farms in two regions of the Baroda district in India are found to be different, due primarily to the variances in irrigation resource. Considered, in a more developed region (MDR) and in a less developed developed region (MDR) and in a less developed to the returns on region (LDR), is whether or not the returns on resource use are maximized and if not, why not. The economic and statistical implications of the selection of functional forms and of variables for estimating production functions for a cross-section of farms are analyzed. Important properties of the three functional forms selected-transcen-dental, log-log inverse, and Cobb-Douglas--are discussed. Variables are chosen in terms of their relevancy, degree of multicollinearity, and the degree of aggregation. Variables selected include: ratio of acreage under high value crops to total crops acreage; net sown area; and expenditures on fertilizers and organic manures, irrigation water, and hired labor. The gross value of all crops grown on a farm is the dependent variable. Findings reveal an uneconomic use of labor and sub-optimum use of fertilizers in LDR. In MDR, where there is more and more evenly-distributed rainfall and a more reliable artificial irrigation source, sample farmers maximized the net returns over all inputs (that are measured in money units). (Bell-W74-01491

THE INFLUENCE OF SOME CLIMATIC FACTORS ON THE PRODUCTIVITY OF RED CLOVER SEED, (IN SERBO-CROATIAN), Zegreb Univ. (Yugoslovia). Faculty of Agricul-

M. Gikic Agron Glas. Vol 33, No 9/10, p 537-544. 1971. Identifiers: *Climatic conditions, *Clover seed (Red), Germination, Light, Photoperiod, Productivity, Relative humidity, Seed, Sun, *Yugoslavia.

The effects of relative humidity, amount of sunlight, photoperiod and soil moisture on red clover ere studied in Zagreb, Osiijek and Djakovo, Yugoslavia. The relative humidity in Osijek was most favorable for seed germination. The amount of sunlight during flowering was found satisfactory in all 3 test sites: it intensified the work of pollinators, resulting in faster seed germination. The tested areas showed favorable daylight conditions for growing the early, medium early and medium late varieties of red clover.--Copyright 1973, Biological Abstracts, Inc. W74-01556

PRODUCTIVITY OF CEREAL CROPS ON ERODED CHERNOZEMS AGAINST BOTH NON-FERTILIZED AND FERTILIZED BACKGROUNDS, (IN RUSSIAN),

A. S. Skorodumov, and L. I. Palyanitsyna.
Agrokhimiya. 12 p, 46-55. 1971. Illus.
Identifiers: "Cereal crops, "Chernozems, Corn,
Crop yield, "Eroded soil, Fertilized areas, Millet,
Nonfertilized areas, Oats, Productivity, Wheat.

Moisture reserves and the content of basic nutrients in chernozems of northern forest-steppes

WATER QUANTITY MANAGEMENT AND CONTROL-Field 04

Control of Water on the Surface.—Group 4A

decreased depending on erodibility, and increased on alluvial soils. On non-fertilized eroded chernozems the cultures in order of increasing reaction to erodibility are: winter wheat, millet, oats, and corn. On alluvial soils yields of corn, then of millet, oats, and winter wheat increased. Fertilizers increased the yields more on eroded soils than on non-eroded and alluvial soils.--Copyright 1973, Biological Abstracts, Inc.

PHYSICAL EDAPHOLOGY. THE PHYSICS OF IRRIGATED AND NONIRRIGATED SOILS, For primary bibliographic entry see Field 02G.

THE CARBOHYDRATE AND WATER BALANCE OF BEANS (VICIA FABA) ATTACKED BY BROOMRAPE (OROBANCHE CRENATA), Royal Univ. of Malta, Valletta. Dept. of Biology.

Ann Appl Biol, Vol 70, No 1, p 59-66, 1972, Illus. Identifiers: *Beans, *Broomrape, *Carbohydrates, Concentration, Desiccation, Orobanche-crenata, Sugar, Vicia-faba, *Water

O. crenata parasitizing beans maintained a slightly higher osmotic pressure than the bean roots, largely because of the higher concentration of sugars in the broomrape tissues. The sugar was withdrawn from the bean mainly as sucrose, which was hydrolyzed to glucose and fructose by the Orobanche. These sugars were then rapidly translocated to the developing flower spike. As well as maintaining a high osmotic pressure this hydrolysis insured sucrose concentration gradient between host and parasite. In the field, bean plants showed wilt symptoms at about the time that the Orobanche flower spikes emerged. The higher the level of infection the lower was the water content of the host. This fall in water content was due to increased water loss by the bean shoots and it seemed unlikely that it was due to water removal by the parasite. The death of the bean was due to desiccation brought about largely by the reduced ability of the carbohydrate-starved roots to extract water from the soil .- Copyright 1973, Biological Abstracts, Inc.

WATER REQUIREMENTS OF WHEAT AND COTTON ON A HIGH WATER TABLE SOIL UNDER ARID CONDITIONS,

West Pakistan Agricultural Univ., Lyallpur. Dept.

of Agronomy. R. A. Khan, S. Ahmad, and M. S. Sharar.

Exp Agric. Vol 9, No 1, p 41-45. 1973. Identifiers: Arid lands, *Cotton, *Pakistan, *Soils, *Wheat, Water table. Irrigation,

The effects of irrigation on the vields of wheat and cotton were studied on a sandy clay loam soil, with a water table at 7 ft below ground, under the arid conditions of Lyallpur (Pakistan). The convenconditions of Lyalipur (Paxistan). The conven-tional practice of providing 19-acre in. of water to Mexican wheat and 25-acre in. to American cotton proved to be a wasteful and unproductive practice on such soils. High yields of both these crops could be obtained without any subsequent water-ing after an initial 4-in. irrigation applied for mg atter an initial 4-in. irrigation applied for seedbed preparation and sowing, while 13-in. ir-rigation after sowing was needed to obtain max-imum yields.—Copyright 1973, Biological Ab-stracts, Inc. W74-01595

CROP ROTATION SCHEMES FOR OPTIMAL UTILIZATION OF AGRICULTURAL LAND, Florida State Univ., Tallahassee. Dept. of

T. K. Kumar, and S. Awasthi. Indian J Agric Sci. Vol 42, No 6, p 448-452, 1972.

Identifiers: Agricultural lands, Computer programs, *Crop rotation, *Irrigation cost, *Optimal utilization, Soils.

The production yield, the irrigation cost and the quality of crop depend on the order in which the crops are cultivated, as well as on the soil type. Twenty-nine crop rotations and 5 soil types were considered. Net revenue maximization (subject to the resource restrictions, consistency conditions and the minimum crop yields required) was formulated and solved as a linear programming problem.—Copyright 1973, Biological Abstracts, Inc. W74-01596

DIURNAL CHANGES IN TRANSPIRATION AND DAILY PHOTOSYNTHETIC RATER OF SEVERAL CROP PLANTS, Agricultural Research Service, Watkinsville, Ga.

For primary bibliographic entry see Field 02D. W74-01597

EFFECT OF MOISTURE STRESS ON SOYBEAN (GLYCINE MAX (L.) MERR.), Indian Council of Agricultural Research, New

N. C. Tripathi.

Indian J Agric Sci. Vol 42, No 7, p 583-585. 1972. Identifiers: Glycine-Max, *Moisture stress, *Soybeans, *Crop yield, Irrigation reduction.

The effect of withdrawal of irrigation at various physiological stages of G. max on the consumptive use of water and yield and yield components was studied. The consumptive use varied 12.9-33.6 cm. Maximum yield of Feb.-planted soybean could be obtained when irrigation was given at intervals of 10 days up to the bean-filled stage. When the plants were subjected to moisture stress at flower-ing, considerable reduction in number of pods, leaf area and length of internode occurred. Moisture stress at pod-development stage was slightly less deterimental to yield than that at flowering stage.—Copyright 1973, Biological Ab-W74-01599

STOMATAL-DIFFUSION RESISTANCE AND WATER POTENTIAL OF SOYBEAN AND SORGHUM LEAVES, Kansas Agricultural Experiment Station, Manbat-

tan. Evapotranspiration Lab.
I. D. Teare, and E. T. Kanemasu

New Phytol. Vol 71, No 5, p 805-810. 1972. Illus. Identifiers: Leaves, Porometer, Psychrometer, Resistance, *Sorghum leaves, *Soybean leaves, *Stomatal diffusion resistance, Thermocouple,

Hourly trends in stomatal resistance and water potential of the upper leaves of sorghum and of soybean (measured with diffusion porometer and thermocouple psychrometer) tended to parallel each other. Vertical profiles (both canopies) in-dicated that the stomatal resistance of the lower leaves usually was greater than that of the upper leaves. The position of minimum resistance varied with time of day. The profiles of temperature and water-vapor pressure were consistent with the profile of canopy transpiration resistance. The upper sorghum leaves had a lower water potential upper sorghum leaves had a lower water potential than the lower leaves. In the morning a strong gradient of water potential existed from lower to upper leaves in plants in both canopies; in the af-ternoon the gradients continued in sorghum but disappeared in soybean plants.—Copyright 1973, Biological Abstracts, Inc. W74-01605

SYSTEM OF TREATING IRRIGATED SOIL WHICH IS SOWN WITH SUGAR BEETS, (IN RUSSIAN), A. M. Pishnamazov.

Dokl Akad Nauk Az SSR. Vol 27, No 11/12, p 72-75. 1971.

Identifiers: *Irrigated soils, *Sugar beets growth, *Soil treatment, Crop yield, *USSR (Azerbaidz-

The effect of soil preparation on growth and yield of sugar beets grown on the heavy soil at the Min-gechaurskii Scientific Station in the Azerbaidzhan SSR was investigated. The moisture content was high in fields prepared by scuffling of the stubble field soil done twice and pre-plowing irrigation. Production was higher when harrowing was added to this process. On the Kovlarskii Scientific Station a single scuffling was most productive. On the weedy soils of E Shervan, preliminary scuffling with subsequent fall plowing was effective. In general, pre-scuffling watering, double scuffling and treatment of the soil to a depth of 27 cm in Oct. supplied the highest yield.—Copyright 1973, Biological Abstracts, Inc. W74-01606

IMPACT OF IRRIGATION INVESTMENTS ON REGIONAL AND URBAN DEVELOPMENT, Resources for the Future, Inc., Washington, D.C. For primary bibliographic entry see Field 06B. W74-01625

SOIL AND WATER CONSERVATION ON ARA-BLE LANDS,

Soils Inst., Tehran (Iran). Soil and Water Conservation Div.

A. Ganjini, and B. Azimi.

In: Cento Seminar on Agricultural Aspects of Arid and Semi-arid Zones, September 19-23, 1972, Thran, Iran, Central Treaty Organization, p 164-171, 1972. 4 tabs.

Descriptors: *Climatology, *Arid climates, Semiarid climates, *Soil conservation, *Water conservation, Precipitation (Atmospheric), Tem-perature, Rainfall, Evaporation, Water loss, *Agropomy. *Agronomy. Identifiers: *Iran, Middle East.

Classification of arid and semiarid areas for agriculture development programs must be deter-mined by considering more than on climatological factor such as precipitation rate, rain distribution, changes in temperature, air currents, evaporation and light intensity. To determine the degree of aridity, two approaches are used: first, determination is made on the basis of temperature and rainfall, and second, determination is based on consideration of evaporation and rainfall. Data analyzed for Iran shows that more than nine-tenths of the total area of the country is arid/semiarid. Also discussed are the causes of water loss and soil erosion in arid and semiarid areas placing emphasis on the increasing soil erosion and water loss in Iran that limits agricultural development. (Bahre-Arizona) W74-01633

04. WATER QUANTITY MANAGEMENT AND CONTROL

IRRIGATION WATERS OF THE INDUS PLAINS

AND THEIR SALT LOAD, Irrigation Research Council, Islamabad (Pakistan). For primary bibliographic entry see Field 03C. W74-01639

4A. Control of Water on the Surface

REPORT OF ATTITUDES AND OPINIONS OF RECREATIONISTS TOWARDS WILD

Field 04—WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A-Control of Water on the Surface

SCENIC RIVERS: A CASE STUDY OF THE ST.

Idaho Univ., Moscow. Water Resources Research Inst

For primary bibliographic entry see Field 06B. W74-01102

A STOCHASTIC MODEL OF STREAMFLOW BASED ON THE THEORY OF FUNCTIONS OF MARKOV PROCESSES,

Arizona Univ., Tucson.

For primary bibliographic entry see Field 02E.

SURFACE-WATER RESOURCES OF THE USSR AND THEIR CHANGE RESULTING FROM HUMAN ECONOMIC ACTIVITY (RESURSY POVERKHNOSTNYKH VOD SSSR I IKH IZ-MENENIYE POD VLIYANIYEM KHOZYAYST-VENNOY DEYATEL'NOSTI), Gosudarstvennyi Gidrologicheskii Institut, Lenin-

grad (USSR).

K. P. Voskresenskiy, A. A. Sokolov, and I. A. Shiklomanov.

Vodnyye Resursy, No 2, p 33-57, 1973. 14 tab, 22

Descriptors: Water resources, *Surface waters, *Surface water availability, *Human population, *Variability, Fluctuations, Rivers, Lakes, Reservoirs, Glaciers, Hydrologic cycle, Runoff, Water utilization, Water supply, Forecasting, Seasonal. Identifiers: *USSR.

The average volume of surface water in the USSR, including the volume of water stored in glaciers and large freshwater lakes, is about 42,000 cu km, of which 4,714 cu km is average annual stream flow. Areal distribution of water resources in the USSR is extremely uneven. The total amount of river water varies slightly from year to year. In individual years, large areas may experience a water shortage or have an excess water supply. Factors affecting hydrologic regimen and streamflow are reservoir construction and operation, irrigation and flooding of lands, industrial and municipal water consumption, afforestation in river basins, drainage of bogs and saturated soils, and urbanization. As of 1970, the total decrease in runoff on 17 major USSR rivers as a result of man's activities was about 55 cu km/year or 1.2% of the country's total river-water resources. Runoff on individual rivers decreased by 10%-20%. Diminished streamflow is expected to reach 120 cu km/year (2.5%) by 1981-85 and 180 cu km/year (3.8%) by 1990-2000. (Josefson-USGS) W74-01133

NEAR REAL TIME WATER RESOURCES DATA FOR RIVER BASIN MANAGEMENT, Geological Survey, Harrisburg, Pa

R. W. Paulson.

Available from NTIS, Springfield, Va. 22151 as E73-10451 Price \$3.00 printed copy; \$1.45 microfiche. Type II Progress Report to NASA for period July 1, 1972 to December 31, 1972-January 1973. 28 p.

Descriptors: *Remote sensing, *Hydrologic data, *Delaware River, *Data collections, Streamflow, Gaging stations, Water wells, Water quality, Telemetry, Satellites (Artificial), Data processing, Computer programs, Water resources. Identifiers: *Real time data.

Twenty Data Collection Platforms (DCP) are being field installed on USGS water resources stations in the Delaware River basin. DCP's are operating on five stream gaging stations, three observation wells, and one water-quality monitor in the basin. DCP's have been installed at nine additional water-quality monitors. ERTS-relayed water resources data from platforms are being provided in near real time, by the Goddard Space Flight

Center, to the Pennsylvania district, Water Resources Division, U.S. Geological Survey. On a daily basis, the data are computer processed by the Survey and provided to the Delaware River Basin Commission. Each daily summary contains data that were relayed during 4 or 5 of the 15 orbits made by ERTS during the previous day. Water-resources parameters relayed by the platforms include dissolved oxygen concentration, temperature, pH, specific conductance, well level and stream-gage height, which is used to compute streamflow for the daily summary. (Woodard-HSGS) W74-01150

SYMPOSIUM ON SIGNIFICANT RESULTS OB-TAINED FROM EARTH RESOURCES TECHNOLOGY SATELLITE-1, MARCH 5-9, 1973: VOLUME III--DISCIPLINE SUMMARY REPORTS.

For primary bibliographic entry see Field 07C. W74-01163

AGRICULTURE, FORESTRY. RANGE RESOURCES.

National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center. For primary bibliographic entry see Field 03F. W74-01164

LAND USE AND MAPPING,

National Aeronautics and Space Administration, Bay Saint Louis, Miss. Earth Resources Lab. D. W. Mooneyhan.

In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md, March 5-9, 1973: NASA Goddard Space Flight Center Publication X-650-73-155, p 18-29, May 1973. 2 append.

Descriptors: *Mapping, *Land use, *Satellites (Artificial), *Remote sensing, Urbanization, Data collections, Planning. Identifiers: *ERTS

ERTS imagery can be used for cartographic photobase products at scales 1:500,000 and smaller. In addition, the ERTS imagery can be used for photographic products to complement existing line maps at scales at least as large as 1:250,000, and to support the revision of existing line maps at many scales. Geometric accuracy is adequate for the in-terpretation of land use. Objects as small as 100 m in diameter and linear features as narrow as 15 m have been identified. Repetitive coverage in-creases accuracy and number of categories considerably. A larger number of land-use categories could be determined by the use of all four channels of ERTS data in conjunction with automatic pattern recognition programs than could be determined from image interpretation. In urban areas, generally three to four categories could be mapped. (See also W74-01163) (Knapp-USGS) W74-01165

WATER RESOURCES.

National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. For primary bibliographic entry see Field 07C. W74-01168

MULTIDISCIPLINARY/REGIONAL RESOURCE SURVEYS,

National Aeronautics and Space Administration, Wallops Island, Va. Wallops Station. For primary bibliographic entry see Field 07B. W74-01171

DEVELOPMENT OF A TIME-SPACE PREDICTION TECHNIQUE TO EVALUATE SNOW-

PACKS IN AND ADJACENT TO FOREST OPENINGS, Arizona Univ., Tucson. Dept. of Watershed

Management.

For primary bibliographic entry see Field 03B. W74-01231

DIE-BACK IN THE MIXED HARDWOOD FORESTS OF EASTERN VICTORIA: A PRELIMINARY REPORT,

Forests Commission of Victoria. Melbourne (Aus-

G. C. Marks, F. Y. Kassaby, and S. T. Reynolds. Aust J Bot. Vol 20, No. 2 p 141-154. 1972, Illus. Identifiers: "Australia (Victoria), "Dieback (Forests), Distribution, "Eucalyptus, Forests, *Hardwood forests, Identification Phytophthora-Cinnamomi.

The distribution and symptons of die-back in the mixed-species eucalypt hardwood forests of east-ern Victora, Australia, are described. The disease was recognized in 1952 in small patches of forest situated in the flat, badly drained sandy coastal soils and has spread rapidly. This spread was associated with above-average rainfall during spring, summer and autumn. Disease symptoms wer similar to that caused by drought, and were observed best during dry periods following summer rain. The lupin bait of Chee and Newhook was used to isolate Phytophthora cinnamomi from the diseased areas, and the field symptoms seen on susceptible eucalypts of the subgenus Renantherae were similar to those observed on young saplings inoculated with P. cinnamoni in the greenhouse. Species of the subgenus Macrantheae observed in the forests and tested in the greenhouse are tolerant to the disease. Estimates of population density indices of the fungus gave highest values in areas where the disease was most active. The fungus was not isolated from adjacent healthy forests. Improvements in the baiting and identification of P. cinnamomi with use of excised lupin radicles floated over a small sample of soil in a petri dish are described. Several variants of the fungus with differing growth rates were isolated.-Copyright 1973, Biological Abstracts, Inc. W74-01251

EFFECTS OF PARAQUAT ON INVER-TEBRATES IN A CANTEBURY STREAM, NEW ZEALAND.

Ministry of Agriculture and Fisheries, Wellington (New Zealand). Fisheries Research Div. For primary bibliographic entry see Field 05C. W74-01298

A METHOD OF FORECASTING THE BUILD-ING OF A RIVER BAR (METOD PROGNOZA PEREFORMIROVANIY RECHNOGO BARA), Moscow State Univ. (USSR). Chair Gemorphology. For primary bibliographic entry see Field 02J. W74-01388 State Univ. (USSR). Chair

ARIZONA'S COMING DILEMMA: WATER SUPPLY AND POPULATION GROWTH,

Ecology Law Quarterly, Vol 2, p 357-384, Spring 1972, 149 ref.

Descriptors: *Arizona, *Water resources development, *Community development, Legal aspects, Water law, Water consumption, Public health, Water policy, Water management, Human popula-

A comprehensive analysis is presented of the water supply problems facing the state of Arizona. It explores the supply and demand of water resources in order to determine whether water supply will set an upper limit on the population growth. The current law governing water rights is

WATER QUANTITY MANAGEMENT AND CONTROL-Field 04

Control of Water on the Surface—Group 4A

discussed in relation to its effect on water consumption and on growth patterns. Prospects are evaluated for maintaining consumption and the present growth rates by increasing the water supply, or, in the alternative, by altering the current water rights system to prevent the exhaustion of water resources. The Colorado River is the major source of surface water for Arizona and the adjoining areas of the Lower Colorado Basin, which also includes the Las Vegas area of Nevada, and the Imperial and Coachella Valleys of southeastern California. However, as accompanying tables indicate, Arizona has completely insufficient supplies of surface water to meet the total demand. Possible future sources include desalinization and inter-regional water diversion. (Mockler-Florida) W74-01452

STORM DRAINAGE AND FLOOD CONTROL FOR METROPOLITAN DENVER.

Denver Regional Council of Governments, Colo.

Project reuse summary report. May, 1973. 18 p, 1 fig. 4 tab. photos.

Descriptors: *River basin development, *Regional planning, *Flood control, *Colorado, Flood Plain Zoning, Storm runoff, Criteria, Standards, Coordination, Urban drainage, Flood plain insurance, Financing.

Identifiers: *Preventive master planning, Project REUSE, Design master planning, Flood warning systems, *Denver (Colo).

The proposed 20-year storm drainage and flood control program under Project REUSE (Renewing the Environment through Systems Engineering) encompasses three types of major drainage activities: (1) preventive master planning, for areas where flood plain regulation, land use controls, and other preventive action can be utilized; (2) design master planning, for areas where problems already exist and facility construction is known to be required; and, (3) construction, for developed areas where preventive measures are not feasible and where channels, culverts, sewers, and other structures are needed to provide protection. The system will provide for: delineation of flood plains on major drainage channels; regulation of all unoc-cupied 100-year flood plains; 100-year protection on occupied flood plains; National Flood Insurance Program coverage on occupied flood plains where protection is not cost effective; the provision, by ordinance, for limitation of runoff from new real estate development; flood storage capacity and spillway protection on dams in the region; integration of major drainage measures with the regional water resource management system; and, an early flood warning system. Cost estimates and an implementation schedule by basin are included. (Hoffman-North Carolina) W74-01475

REPORT ON LAUREL CREEK CHANNEL IM-PROVEMENTS, WATERLOO BRIDGEPORT, ONTARIO. Kilbom Engineering Ltd., Toronto (Ontario).

Prepared for Grand River Conservation Authority, Cambridge, Ontario. December 1972. 53 p, 7 fig, 2 tab, 4 plates, 4 append.

Descriptors: *Flood protection, *Channel improvement, *Aeration, Flood control, Erosion control, Culverts, Water quality control, Oxygen demand, *Canada, Farm wastes.

Identifiers: *Cascades, Fountains, Bubbler systems, Aerators.

Laurel Creek, which flows through Waterloo and Bridgeport, Ontario, has caused flooding and eronopolems. During low flow periods, water quality has been adversely affected by pollutants entering the stream. Design flows for the Creek

were based on calculations of the 100-year floods. assuming a certain degree of future urbanization and certain runoff proportions. To accomodate the 100-year flood, sections of box culvert, concretelined, grass-lined, and rip-rap-lined channels are recommended at various locations, depending on land costs. A dam above Waterloo is an alternative solution, but only one site is feasible. The dam was recommended in 1965, but is not recommended now. The culverts could be built in three identified stages, thereby spreading costs over time. Water quality of Laurel Creek is compared to Ontario Water Resources Commission standards. Water quality is generally good, but could be improved by aeration. Farm wastes in the spring is a problem to the Creek, adding carbon, nitrogen, and phosphorus, and contributing to biological oxygen demand. Techniques of aerating water, i.e. cascades, fountains, bubbler systems, and mechanical aerators are described and illustrated. Cascades along the channel in Waterloo and Bridgeport are suggested as the best aeration method for Laurel Creek. (Stein-North Carolina) W74-01482

FLOODLAND AND SHORELAND DEVELOP-MENT GUIDE.

Southeastern Wisconsin Regional Planning Commission, Waukesha.

Planning Guide No. 5, November 1968. 199 p, 47 fig, 9 maps, 56 ref, 17 append.

Descriptors: *Flood protection, *Pollution abatement, *Urbanization, Water quality control, Flood control, Land management, Regulation, *Wisconsin, Comprehensive planning.

Identifiers: *Shoreland management, *Floodplain management, *Land use planning, Environmental corridors

The nature of floodland and shoreland problems and proposed comprehensive programs to deal with these problems are presented. This guideline report is intended to be used by cities and counties in Southeastern Wisconsin to help local governments solve their water resource problems and to coordinate them into a regional management framework. Many of the problems discussed relate to urbanization in critical water management areas where natural processes are adversely affected or to water quality problems created by poorly planned urban development. Thus, the need for comprehensive land use and water use planning is stressed and various program elements are out-lined: protection of existing development, e.g. flood warning and floodproofing; removal of existing development; discouragement of new development, e.g. tax and finance policies; regulation of new development, e.g. zoning and sanitary ordinances; abatement of pollution, e.g. diversion of wastewater and low flow augmentation. A section on legal authority and administration of or-dinances and regulations is included. (Elfers-North Carolina)

STUDY OF THE SPEED OF WATER CIRCULA-TION IN A WATER-BEARING LIMESTONE DEPOSIT BY TRACING TESTS (LA SERRIERE RIVER BASIN/NE), Neuchatel Univ. (Switzerland). Centre de

Neuchatel Univ. (Switzerland). Centre d Hydrogeologie. For primary bibliographic entry see Field 02F. W74-01563

EXPERIMENTAL ESTABLISHMENT OF FOREST PLANTATIONS ON SANDS, IN ACCORDANCE WITH THE IDEA OF G. N. VYSOTSKII (IN RUSSIAN), For primary bibliographic entry see Field 021. W74-01569

PROTECTIVE FUNCTION OF THE FOREST IN AREAS OF WATERWORK RESERVOIRS, (IN CZECH),

Vysoka Skola Zemedelska, Brno (C-zechoslovakia). Fakulta Lesnicka.

Acta Univ Agric Fac Silvic. Vol 40, No 2, p 119-124, 1971, Illus.

Identifiers: *Forest, Human health, Pollution, Protective foundations, Reservoirs, *Waterwork reservoirs, *Water supply, Water purity.

The necessity of protecting the water supply on its way from springs to the points where it enters other recipients is emphasized. The use of water is ever-growing as is the contamination of water. Properly-managed forest stands could protect the water resources and efficiently influence the purity of the resources and human health.—Copyright 1973, Biological Abstracts, Inc. W74-01582

TALLAHALA CREEK LAKE, PASCAGOULA RIVER BASIN. MISSISSIPPI (FINAL ENVIRON-MENTAL IMPACT STATEMENT). Army Engineer District. Mobile. Ala.

Available from National Technical Information Service, as EIS-MS-72-5336-F, \$8.00 paper copy, \$1.45 microfiche. 1972. 106 p, 4 plate.

Descriptors: *Mississippi, *Environmental effects, *Flood control, Water quality control, Watershed management, Recreation, Dams, Water supply, Wildlife habitat, Forests, Agriculture.

Identifiers: *Environmental impact statements.

The project would serve to initiate land acquisition and construction of a dam 7,880 feet long for the purpose of impounding waters of Tallahala Creek to provide flood control, water supply, water quality control and recreation, including fish and wildlife enhancement. Adverse environmental effects include loss of 4,435 acres of agricultural and forest land and its associated wildlife habitat and loss of free-flowing stream fisheries. Desirable effects include providing a dependable water supply and high quality recreation. Alternatives considered included alternative sites and single purpose projects; however, these are considered less efficacious or economically infeasible. Also, no development at all was considered as an alternative. The project is authorized by the Flood Control Act of 1968 and is currently in the preconstruction planning stage. (Mockler-Florida)

HYDROGRAPH SIMULATION MODELS OF THE HILLSBOROUGH AND ALAFIA RIVERS, FLORIDA: A PRELIMINARY REPORT, Geological Survey.

J. F. Turner, Jr.

Open File Report, No 72025, 1972. 107 p, 4 tab, 28 illus.

Descriptors: *Florida, *Hydrograph analysis, *Flood forecasting, River forecasting, River basins, Comprehensive planning, Flood control, Flood prevention, River basin development, Streamflow.

Serious water-management problems are being caused by flood-plain development in the Hill-sborough and Alafia River Basins. Encroachment by urban development of the flood-prone areas has greatly increased in recent years. The U.S. Corps of Engineers have proposed the construction of numerous flood-retention reservoirs on many headwater tributaries, as well as other flood control measures including a bypass canal for the Hillsborough River. The by-pass canal would divert a significant part of flood water from the Hillsborough River to Tampa Bay, thereby preventing flooding of the Tampa-Temple Terrace

Field 04-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A-Control of Water on the Surface

area except under the most extreme conditions. Additional drainage improvements are also proposed for the upper reaches of the basin. The objective of the investigation is to develop mathematical models that simulate segments of the streamflow hydrograph. Simulated streamflow discharges will be used in evaluating and implementing flood control and abatement programs within these basins. (Mockler-Florida) W74-01611

ALLUVION, ISLANDS, AND SAND BARS, For primary bibliographic entry see Field 06E.

TALLULAH CREEK WATERSHED (LONG CREED PORTION) GRAHAM COUNTY, NORTH CAROLINA (FINAL ENVIRONMEN-TAL IMPACT STATEMENT).

Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 04D. W74-01621

HYDROLOGICAL INFORMATION FOR THE PLANNING OF WATER RESOURCES IN DEVELOPING COUNTRIES (L'INFORMATION HYDROLOGIQUE POUR LA PLANIFICATION DES RESOURCES HYDRAULIQUES DANS LES PAYS EN VOIE DE DEVELOPPEMENT). Office de la Recherche Scientifique et Technique

OUtre-Mer, Paris (France). For primary bibliographic entry see Field 07C. W74-01623

WATER RESOURCES PLANNING MOZAM-**BIQUE (LA PLANIFICATION DES RESOURCES** EN EAU AU MOZAMIQUE),

Servicos Hidraulicos, Lourenco For primary bibliographic entry see Field 06B. W74-01629 (Mozambique).

BRUSH ERADICATING, BASIN PITTING, AND SEEDING MACHINE FOR ARID TO SEMIARID RANGELAND, New Mexico State Univ., University Park. Dept.

of Agriculture Engineering.
G. H. Abernathy, and C. H. Herbel.
Journal of Range Management, Vol 26, No 3, p
189-192, May 1973. 5 fig., 2 tab, 5 ref.

Descriptors: *Range management, *Arid climates, *Semiarid climates, Shrubs, Desert plants, *New Mexico, Southwest U.S., Planting management, Seeds, Viability, Land reclamation, Mechanical control, *Revegetation. Identifiers: *Creosotebush. *Tarbush.

Several million acres of once productive rangeland in arid and semiarid areas have been invaded by noxious shrubs such as creosotebush (Larrea tridentata) and tarbush (Flourensia curnua). These shrubs do not produce useful forage for livestock or wildlife, nor adequate ground cover to prevent soil erosion. A range seeding machine that increases the chances of successful seeding establishment on arid to semiarid rangeland has been designed and tested on 23 plots in southern New Mexico. Working behind a standard root-plow, the machine picks up brush, forms basin pits, firms the soil, plants seed, and replaces the brush over the planted area as a mulch. Most plots were about 5 acres and were seeded with a mixture of desirable forage species adapted to the site. About 5 percent of the seedings were considered successful. Studies demonstrated that much of the depleted rangeland in southern New Mexico can be restored. On sites completely dominated by creosotebush and tarbush, rootplowing followed by seeding with proper equipment can be effective. Site requirements include: fine-textured soil to resist wind erosion, a slope percent low enough to resist water erosion, and reasonable rainfall. (Black-Arizona) W74-01637

EFFECTS OF LEAF-FOOTED BUGS ON MESQUITE REPRODUCTION.

Texas Tech Univ., Lubbock. Dept. of Range and Wildlife Management. D. N. Ueckert.

Journal of Range Management, Vol 26, No 3, p 227-229, May 1973. 4 fig, 1 tab, 13 ref.

Descriptors: *Mesquite, *Weed control, *Range management, *Invasion, Desert plants, *Texas, Southwest U.S., Insects, Plant populations, Biocontrol, Seeds, Poisonous plants, Browse utilization, Germination.

Identifiers: *Rolling Plains (Texas).

Mesquite (Prosopis glandulosa) infests millions of acres of arid and semiarid southwestern rangeland and is constantly invading or increasing in her-baceous plant communities. As a method of controlling this weed, conservation of existing weedfeeding insects has been suggested. In a sleeve cage study, various population densities of leaffooted bugs (Mozena obtusa Uhler) were observed feeding on immature mesquite pods in the Rolling Plains of Texas. Their feeding significantly increased the abortion of immature mesquite pods while decreasing the dry weight of pods and seeds and the germination percentage of seeds. Seedlings from seeds fed upon by this insect were significantly smaller and less bigorous than thos from bug-free seeds. This insect may limit the reproduction of mesquite and may offer a possible method of control. However, where stockmen depend upon mesquite pods for emergency livestock feed, this source of energy and protein would be significantly reduced by the insects if population densities should become high. (Black-Arizona) W74-01638

CONCEPT-SCALE INTERACTION WITH THE SEMANTIC DIFFERENTIAL TECHNIQUE, Virginia Polytechnic Inst. and State Univ. Blacksburg. Dept. of Sociology. For primary bibliographic entry see Field 06B. W74-01644

4B. Groundwater Management

PREDICTION OF WELL DEVELOPMENT POS. SIBILITIES IN DELAWARE BY MEANS OF CALIBRATED GAMMA-RAY LOGS, Delaware Geological Survey, Newark.

K. D. Woodruff.

Available from the National Technical Informastron Service as PB-225 120/5, \$2.75 in paper copy, \$1.45 in microfiche. University of Delaware, Newark. Project Completion Report, August 1973. 19 p, 6 fig, 2 tab, 9 ref. OWRR A-023-DEL (1).

Descriptors: *Borehole geophysics, *Radioactive well logging, *Logging (Recording), *Water wells, Subsurface investigations, Water supply forecast-

ing, Clays, *Delaware.
Identifiers: *Well development prediction.

Small amounts of clay within sandy Coastal Plain sediments of northern Delaware often hinder successful well development. Clays usually show relatively higher gamma radiation than do sands. Thus it was thought that gamma radiation logging techniques could be refined to determine the amount of clay within a given depth interval and thus predict the chances for successful well development. Test holes were augered to various depths in selected formations and cores were taken every five feet. A gamma log was run through the hollow stem augers in the completed hole and again in the open hole after the augers were pulled. The output of the gamma probe was calibrated in counts per second. The core samples were analyzed for clay percentages and the clay percentages compared against the gamma readings for the corresponding depths. Results showed that a rough set of curves showing counts per second versus clay percentage could be made for various hole conditions. However, local drillers report difficulty in well development when clay percentages are as low as 2% to 5%. At this low range the possible statistical error of any one gamma reading can give over a 5% possible error in prediction of clay content. Preliminary work showed that this problem might be overcome by holding the gamma probe at rest opposite the depth of interest and counting pulses with an electronic counter.
W74-01106

CALCULATION OF PERMEABILITY OF CRETACEOUS SANDSTONES FROM PUMPING AND STATIC LEVEL DATA IN SELECTED AREAS OF WESTERN SOUTH DAKOTA,

South Dakota School of Mines and Technology, Rapid City. Dept. of Geology and Geological Engineering.

For primary bibliographic entry see Field 02F.

DETERMINATION OF THE TOTAL STORAGE CAPACITY OF THE CRETACEOUS SAND-STONE AQUIFERS IN SOUTH DAKOTA,

South Dakota School of Mines and Technology, Rapid City. Dept. of Geology and Geological Engineering. For primary bibliographic entry see Field 02F.

RELATIONSHIP OF PUMPING LIFT TO ECONOMIC USE OF GROUNDWATER FOR IR-RIGATION.

Idaho Univ., Moscow, Dept. of Agricultural Engineering.
G. L. Corey, and K. H. Lindeborg.
Available from the National Technical Informa-

tion Service as PB-225 147/8, \$2.75 in paper copy, \$1.45 in microfiche. Idaho University Water Resources Research Institute, Research Project, Technical Completion Report, April 1971. 4 p, 7 ref. OWRR B-006-IDA (3).

Descriptors: *Irrigation, *Groundwater, *Pump-*Economic efficiency, *Idaho, response, Crop production, Agriculture, Costs, Evaluation, Economic justification, Data collections, Grains (Crops), Potatoes, Alfalfa, Beans,

Field data were collected on projects and farms in the irrigated areas of southern Idaho. Guidelines were made as to how high groundwater could be lifted and still be economically supplied to irrigation farmers. The economic maximum lift was about 680 feet on a 400-acre farm, and about 770 feet on a 600-acre farm with an irrigation efficiency of 55% on both farms. The five major crops included in the analysis were grain, potatoes, alfalfa, beans and sugar beets. The total farm returns to water and management for the typical farms ranged from \$25 on the 200-acre farm to \$52 on the acre farm. The comparable optimum farm returns ranged from \$30 on the 200-acre farm to \$56 on the 600-acre farm. The results of the optimum allocation of the resource are very close to the results of the typical farms, which indicates that the farmers included in the sampling are actually operating their farm at the economic op-timum level. (Woodard-USGS) W74-01120

BALANCE ESTIMATE OF GROUNDWATER RESOURCES ON THE NORTHWESTERN SLOPE OF THE CAUCASUS (BALANSOVAYA OTSENKA RESURSOV PODZEMNYKH VOD

WATER QUANTITY MANAGEMENT AND CONTROL—Field 04

Groundwater Management—Group 4B

SEVERO-ZAPADNOGO SKLONA BOL'SHOGO KAVKAZA).

Vodnyye Resursy, No 2, p 130-133, 1973. 2 ref.

Descriptors: *Groundwater resources, *Groundwater basins, *Artesian aquifers, *Confined water basins, *Artesian aquifers, *Confined water, *Water balance, Precipitation (Atmospheric), Runoff, Flow, Base flow, Hydrodynamics, Estimating.

Identifiers: *USSR (Caucasus Mountains), Water

The northwestern slope of the Caucasus is the major source of supply of natural groundwater to the large Azov-Kuban' artesian basin, covering more than 110,000 sq km. Precipitation in the area of the basin is 533 mm; total runoff is 167 mm; surface runoff 92 mm; groundwater runoff is 51 mm; artesian flow is 24 mm; and evaporation is 366 mm. The rate of groundwater recharge is 2.1 million cu m/day. Groundwater discharge into the Kuban' River is 700,000 cu m/day, into the Don and Manych Rivers--90,000 cu m/day, and into the Sea of Azov-1.17 million cu m/day. Formation and distribution patterns of deep artesian flow in the basin are examined, and rates of exchange of water between Neogene and Paleogene artesian aquifers are determined. (Josefson-USGS) W74-01136

REGIONAL ESTIMATE OF BRACKISH- AND REGIONAL ESTIMATE OF BRACKISH- AND
SALINE-GROUNDWATER YIELD (REGIONAL'NAYA OTSENKA EKSPLUATATSIONNYKH RESURSOV SOLONOVATYKH I
SOLENYKH PODZEMNYKH VOD),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.

nykh Problem.

M. R. Nikitin, and K. N. Tsyganova. Vodnyye Resursy, No 2, p 134-149, 1973. 5 fig, 4 tab, 10 ref.

Descriptors: *Groundwater, *Saline *Brackish water, *Water yield, *Estimating, Water supply, Water utilization, Aquifers, Con-fined water, Costs, Economic efficiency, Maps,

Identifiers: *USSR (Kalmyk ASSR), Minerlaiza-

General problems involved in a regional estimate of the rate at which brackish and saline groundwater can be artificially withdrawn for water supply are examined. Principles and techniques of such an estimate are described and applied to saline groundwater in the southwestern part of the Caspian Lowland in the Kalmyk ASSR. Potential yield of brackish and saline groundwater in Quaternary and Upper Pliocene deposits of the Republic is estimated at 96.5 cu m/sec, and areal potential yield is 1.4 liter/sec/sq km. (Josefson-USGS) W74-01137

PROBLEMS IN REGIONAL DYNAMICS OF AR-TESIAN WATER (PROBLEMY REGIONAL'-NOY DINAMIKI ARTEZIANSKIKH VOD), For primary bibliographic entry see Field 02F. W74-01141

HYDROGEOLOGIC CHARACTERISTICS OF THE VALLEY-FILL AQUIFER IN THE WEL-DONA REACH OF THE SOUTH PLATTE RIVER VALLEY, COLORADO, Geological Survey, Lakewood, Colo. Water Resources Div.

Resources Div.

R. T. Hurr, and P. A. Schneider, Jr. Open-file report, 1972. 2 p, 1 fig, 6 plate, 4 ref.

Descriptors: *Hydrogeology, *Aquifer characteristics, *Water wells, *Colorado, River basins, Valleys, Bedrock, Groundwater, Water table, Zone of saturation, Geomorphology, Transmissivity, Maps, Contours.

Identifiers: *South Platte River Valley (Colo), Weldona reach, Valley-fill aquifer, Stream deple-

This atlas describes the hydrogeologic characteristics in the Weldona reach of the South Platte River Valley, Colorado, through 6 maps: (1) location of wells in 1968; (2) bedrock configuration beneath the valley-fill aquifer; (3) water-table contours of the valley-fill aquifer in March 1968; (4) saturated thickness of the valley-IIII aquite: III March 1968; (5) transmissivity of the valley-fill aquifer; and (6) stream-depletion factor of the valley-fill aquifer. (Woodard-USGS) W74-01142 turated thickness of the valley-fill aquifer

GROUND-WATER VIELD POTENTIAL IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.

SENSITIVITY OF GROUNDWATER FLOW MODELS TO VERTICAL VARIABILITY OF AQUIFER CONSTANTS, Oklahoma State Univ., Stillwater. Dept. of Civil

Engineering. R. N. DeVries, and D. C. Kent.

Water Resources Bulletin, Vol 9, No 5, p 998-1005, October 1973. 4 fig, 5 ref.

Descriptors: *Hydrogeology, *Mathematical models, *Drawdown, *Water yield, Withdrawal, Aquifers, Aquifer characteristics, Water management (Applied), *Oklahoma, Groundwater move-ment, Permeability, Stratification, *Computer Identifiers: *Ogallala aquifer (Okla).

A computer model developed for the Ogallala aquifer in the Texas Panhandle treats the aquifer as a homogeneous system. The model evaluates the effects of vertical layering on semistatic water level changes which occur during the dewatering of a single unconfined aquifer. Near Guymon, Oklahoma, the aquifer is characterized by a saturated thickness of 400 feet. The accumulated drawdown values of the homogeneous and the multilayered cases demonstrate that an average difference of approximately 22% of the original saturated thickness occurs between the two cases before the base of the aquifer is encountered. Approximately 25% more time is required to dewater the layered aquifer. Thus, vertical variations of lithology in an aquifer such as the Ogallala should be considered when prediction is made relative to groundwater management. (Knapp-USGS) W74-01151

DRAWDOWN AT TIME-DEPENDENT FLOWRATE, Wisconsin Univ., Milwaukee. Coll. of Applied Science and Engineering.
For primary bibliographic entry see Field 02F.
W74-01155

A DISTRIBUTED HYDROLOGICAL MODEL BASED ON THE CONCEPT OF GROUND-WATER RECHARGE, TRANSMISSION, AND DISCHARGE, Department of the Environment, Ottawa (On-

For primary bibliographic entry see Field 02F. W74-01233

GEOTHERMAL RESOURCE INVESTIGA-TIONS,

Bureau of Reclamation, Boulder City, Nev. Region 3. L. R. Porter.

ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10136, p 2097-2111, November 1973. 13 fig, 1 tab, 7 ref.

Descriptors: *Geothermal studies, *California, Desalination, Groundwater, Heat flow, Water management (Applied), Thermal water, Water yield improvement. Identifiers: Geothermal powerplants, *Imperial Valley (Calif).

As a major step toward augmentation of the water supply of the Lower Colorado River basin, the Bureau of Reclamation is investigating the geothermal resource potential of the basin underlying California's Imperial Valley. Multipurpose development of hot geothermal brines may produce upward of 2,500,000 acre-ft of high quality water per year, and add up to 10,000,000 kw of electrical generating capacity to Pacific Southwest power systems. Investigations to date indicate that several billion acre-ft of hot brine exist in the Imperial Valley geothermal field. When subsurface pressures are tapped by a deep well, the hot brine will flash into a mixture of steam and water. This mixture will flow to the surface and can be used to produce not only desalted water but, also, electrical power and, possibly, mineral byproducts. A deep geothermal test well, Mesa 6-1, was drilled and tested in 1972 and a portable research desalt-ing unit installed in 1973. (Knapp-USGS) W74-01273

NUMERICAL SOLUTION OF MULTIPHASE WELL FLOW, New Mexico Inst. of Mining and Technology,

Socorro. Dept. of Ground-Water Hydrology. For primary bibliographic entry see Field 08B. W74-01275

OXNARD BASIN EXPERIMENTAL EXTRAC-TION-TYPE BARRIER,

California State Dept. of Water Resources, Sacramento. For primary bibliographic entry see Field 08B.

W74-01289

STORAGE AND RETRIEVAL OF GROUND-WATER DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.

For primary bibliographic entry see Field 07C. W74-01291

RECOGNITION OF NATURAL BRINE BY ELECTRICAL SOUNDINGS NEAR THE SALT FORK OF THE BRAZOS RIVER, KENT AND STONEWALL COUNTIES, TEXAS, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 02F. W74-01370

AVAILABILITY OF FRESH WATER IN THE EAST CENTRAL FLORIDA PLANNING RE-GION.

Aase (George) and Associates, Inc., Tallahassee. For primary bibliographic entry see Field 06D. W74-01481

A HYBRID MODEL FOR IRRIGATION PLANNING USING CHANCE CONSTRAINED PROGRAMMING AND HYDROLOGIC SIMU-LATION,

Norwegian Inst. of Urban and Regional Research, Oslo. D. V. Smith.

International Journal of Systems Science, Vol 4, No 4, p 533-544, 1973. 2 fig, 1 tab, 3 ref.

Descriptors: *Irrigation systems, *Project planning, *Groundwater, Operation and maintenance, *Linear programming, *Stochastic processes, Water balance, Canals, Wella, Pumping, Crops, Rivers, Rainfall, Streamflow, Monte Carlo method, Surface waters, Constraints,

Field 04-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4B-Groundwater Management

Aquifers, Equations, Mathematical models, Algorithms, Systems analysis.

Identifiers: *Cost minimization, *Bangladesh, Nonlinear programming.

An irrigation system consisting of a river and a groundwater aquifer from which irrigation water can be obtained and of land suitable for irrigation development is modeled to examine economic implications of alternative allocations of surface and ground waters. The planning objective is to select well and canal capacities which minimize the expected value of project costs while meeting crop water requirements, preventing excess water applications, and requiring the expected annual change in the amount of groundwater storage to be zero. Decision rules for canal diversions and well pumpages in each time period are considered functions of (stochastic) rainfall and streamflow. The formulation of reasonable decision rules is discussed and a model incorporating stochastic demands and supplies is constructed. A series of more complex decision rules is tested; for these rules, at each iteration of the algorithm a separation is made in a 'master' linear program of the effects of stochastic supplies from those of stochastic demands. The algorithm utilizes a Monte Carlo technique to adjust the 'supply and demand effects' at each iteration in accordance with the desired probabilistic relations and the optimal solutions to the previous iteration's dual problem. Results are presented for a proposed irrigation scheme in Bangladesh. (Bell-Cornell) W74-01488

ON THE OPTIMAL OPERATION OF GROUND-WATER BASINS: A CALCULUS OF VARIATIONS APPROACH,

Illinois Univ., Urbana. Dept. of Geology. V. V. Palciauskas, and P. A. Domenico. Journal of Hydrology, Vol 20, (Amsterdam), p 181-189, October 1973. 5 ref.

Descriptors: *Groundwater basins, *Groundwater mining, *Storage volume, *Economic efficiency, Water supply, Resource allocation, Optimization, Equations, Mathematical models, Systems analysis.

Identifiers: *Calculus of variations, *Groundwater allocation, Benefit maximization.

The calculus of variations in employed to determine the maximum of a functional expressing the groundwater allocation problem. Emphasis is on deriving simply-structured decision rules for efficient use of groundwater basins and efficiency is interpreted as benefit maximization consistent with stability of supply. A general ordinary dif-ferential equation for the lumped parameter groundwater allocation problem is derived using variational techniques and solved by specifying either the length of a mining period or the total volume to be mined. Specifying either one of these, uniquely determines the other in terms of economic parameters entering through the benefit function. An infinite mining period sets an upper limit to the total volume to be optimally extracted and provides for the greatest economic benefit. As the mining period is shortened, the one-time exploitable volume is reduced. Although most of the calculations have been carried out for a quadratic benefit function, the detected competition between marginal productivity and the rate of interest insofar as they influence the optimal storage volume and its allocation through use rates ap-pears to be valid in general. (Bell-Cornell) W74-01489

SHIGELLA SONNEI ISOLATED FROM WELL WATER,

Iowa Univ., Iowa City. State Hygienic Lab. For primary bibliographic entry see Field 05A. W74-01551 REGIONAL WATER RESOURCES STUDIES --A SPANISH EXPERIENCE,
Garaghty and Miller, Port Washington, N.Y.

Garaghty and Miller, Port Washington, N.Y. F. van der Leeden.

Paper presented at Internation Symposium on Water Resources Planning, Mexico City, December 1972, 37 p, 9 fig, 8 ref.

Descriptors: *Groundwater, *Water supply, *Surface water, *Water resources, Subsurface water, Aquifer characteristics, Groundwater resources, Surface water availability, Groundwater availability, Resource development, Water resources development, *Regional analysis.

The Spanish government has carried out a series of unique regional hydrologic studies for the purpose of evaluating national water resources since 1968, which have proved a valuable tool in the assessment of Spain's groundwater resources and in planning, development, and management. These studies have investigated water demand, identified serious water oriented problems, estimated surface and groundwater resources available for use, identified schemes for possible water development and for solving critical water problems, and recommended additional investigations. The studies were short and intense; field work was kept to an absolute minimum and stress in placed on the evaluation of existing data. One of these studies, which examines a 25,000 sq mi. semi-arid region of Spain, is used as an example of the regional water resources analysis used in the area. (Muller-Arizona) W74-01622

HYDROLOGICAL INFORMATION FOR THE PLANNING OF WATER RESOURCES IN DEVELOPING COUNTRIES (L'INFORMATION HYDROLOGIQUE POUR LA PLANIFICATION DES RESOURCES HYDRAULIQUES DANS LES PAYS EN VOIE DE DEVELOPPEMENT), Office de la Recherche Scientifique et Technique

OUtre-Mer, Paris (France).
For primary bibliographic entry see Field 07C.
W74-01623

UNDERGROUND STORAGE OF TEXAS PLAYA
LAKE WATERS BY INJECTION INTO THE
OGALLALA FORMATION UNDER
MODERATE PUMP PRESSURE,
Texas Tech Univ., Lubbock.
F. B. Conselman, P. Johnson, and D. A. Crawford.

F. B. Conselman, P. Johnson, and D. A. Crawford.
Paper presented at International Symposium on
Water Resources Planning, Mexico City,
December 1972, 16 p., 20 ref.

Descriptors: *Recharge, *Artificial recharge, *Injection, *Recharge wells, *Playas, Groundwater, Overdraft, Pumping, Withdrawal, Groundwater resources, Aquifers, Lake basins, Surface waters, *Texas, Storage, Groundwater recharge, Underground reservoirs. Identifiers: *Ogallala Formation (West Texas).

An update is presented on an investigation being conducted to determine the feasibility of recharging the Ogallala Formation by injection of surface playa lake waters in the semi-arid High Plains of West Texas. Ogallala groundwater is now being mined, since there are no rechargeable outcrops to the aquifer. Runoff collects in shallow playas, since there is no well developed drainage in the area. By injection of such unused waters into the Ogallala, it is hoped to establish a method of recharging the aquifer with good quality water that would help end the need for mining the aquifer. Past studies have shown that aquifer clogging by suspended solids and colloids in playa water is a significant problem. In this study effects of injection are monitored by observation wells, with quality determinations showing playa water better than that of the Ogallala. The major result of this study is that the injection well clogging has been

overcome by wells which apply moderate pump pressure and maintain sufficient fluid turbulence at aquifer entry. Flow rates have been attained near 2000 gpm and one well has successfully injected 64 acre feet of playa water at 1500 gpm at 55 surface psi. Low cost injection wells using good quality waste playa water may increase the aquifer storage in the area to a large extent while offering flood control and new drained agricultural lands. (Muller-Arizona) W74-01627

IRRIGATION WATERS OF THE INDUS PLAINS AND THEIR SALT LOAD, Irrigation Research Council, Islamabad (Pakistan).

Irrigation Research Council, Islamabad (Pakistan) For primary bibliographic entry see Field 03C. W74-01639

4C. Effects on Water of Man's Non-Water Activities

HYDROLOGIC NUTRIENT CYCLE INTERAC-TIONS IN UNDISTURBED AND MANIPU-LATED ECOSYSTEMS (WATERSHEDS), New Mexico Univ., Albuquerque. Dept. of Biolo-

gy.
J. R. Gosz.
Available from the National Technical Information Service as PB-225 139/5, \$3.00 in paper copy,
\$1.45 in microfiche. New Mexico State University,
Las Cruces, Water Resources Research Institute,
Technical Completion Report No. 031, 1973. 29 p,
5 fig, 6 tab, 11 ref. OWRR A-039-NMEX (4).

Descriptors: Ecosystems, *Watersheds (Basins), *Trees, Water chemistry, *New Mexico, Weathering, *Cycling nutrients, *Watershed management, Mountain forest, Elevation, Precipitation (Atmospheric), Temperature, Throughfall, Fir trees, Pinon pine trees, Juniper trees, Forests, Conifers, Magnesium, Calcium, Sodium, Potassium, Water pollution, *Nitrates, Cations, Anions, Climate, Minerals, Water pollution sources, Nutrients. Identifiers: *Mineral cycling, Climatic conditions, Litterfall, Faunal, Tesuque Watershed, Cation flux, Spruce trees, Aspen.

The objectives were to understand mineral cycling and stream water chemistry of forested watersheds on New Mexico as influenced by vegetational communities, climatic conditions, weathering of soil minerals, and man. Studies to date show water quality changes over elevation, with the lowest concentrations of elements occurring at the highest elevations. This trend is consistent throughout the year; however, actual concentration values vary due to the source of water (e.g. snow melt at high or low elevations) and seasonal patterns of biological activity. Variation in concentration is greatest at lower elevations. The reasons for the higher concentrations at lower elevations are increased evapotranspiration and a combination of biological controls and bedrock weathering differences. For nitrate, variation in concentration is a result, primarily, of biological activity and climatic factors (precipitation, temperature). Research needed to identify mechanisms of biological control involve transfer of materials within the system. A limited number of these results are presented. The information gathered from natural areas is essential in evaluating man's activities. The only land use activity evaluated to date has been minor; replacing a poma ski lift on the border of a watershed. An additional loss of Ca and Mg did occur during September and October and was attributed to the con-struction of the new lift. Additional ski area development is currently being evaluated. (Creel-New Mexico) W74-01110

Watershed Protection—Group 4D

SURFACE-WATER RESOURCES OF THE USSR AND THEIR CHANGE RESULTING FROM HUMAN ECONOMIC ACTIVITY (RESURSY POVERKHNOSTNYKH VOD SSSR I IKH IZ-MENENIYE POD VLIYANIYEM KHOZYAYST-VENNOY DEYATEL'NOSTI), Gosudarstvennyi Gidrologicheskii Institut, Lenin-

grad (USSR). For primary bibliographic entry see Field 04A.

URBANIZATION AND ITS EFFECTS ON REGIMEN AND QUALITY OF SURFACE WATERS (URBANIZATSIYA I YEYE VLIYANIYE NA REZHIM I KACHESTVO POVERKHNOSTNYKH VOD),

Gosudarstvennyi Gidrologicheskii Institut, Lenin-

grad (USSR). V. V. Kupriyanov, and B. G. Skakal'skiy. Vodnyye Resursy, No 2, p 172-182, 1973. 2 fig, 2

Descriptors: *Urbanization, *Urban hydrology, *Urban sociology, *Surface waters, *Water quality, Water pollution, Water balance, Urban runoff, Cities, Foreign research. Identifiers: *USSR.

Some aspects of the effects of urban development on regimen and quality of natural waters are considered. The effects of urbanization on water quantity and quality alterations can be determined from the changes in water balance, hydrologic regimen, and wa'er quality in urban and suburban areas, and from the effects of cities on water balance, hydrologic regimen, and water quality of surrounding areas. Soviet and foreign data on the effects of urbanization on regimen and quality of water can be used in calculating the hydrologic and hydrochemical effects of urbanization and in studying the contemporary trend toward more intensive urban development. (Josefson-USGS) W74-01139

TIDEWATER SHORELINES IN BROWARD AND PAIM BEACH COUNTIES, FLORIDA: AN ANALYSIS OF CHARACTERISTICS AND CHANGES INTERPRETED FROM COLOR, COLOR INFRARED AND THERMAL AERIAL IMAGERY

Florida Atlantic Univ., Boca Raton. Remote Sensing and Interpretation Lab. For primary bibliographic entry see Field 02L.

4D. Watershed Protection

OBJECTIVE REGIONALIZATION OF PEAK FLOW RATES, Agricultural Research Service, Chickasha Okla.

Soil and Water Conservation Research Div. D. G. DeCoursey.
In: Proceedings of the Second International Sym-

posium in Hydrology, September 11-13, 1972, Fort Collins, Colorado, p 395-405, (1972). 3 fig, 6 tab, 6 ref.

Descriptors: *Regional analysis, *Floods, *Regression analysis, *Peak discharge, Watersheds (Basins), Drainage area, Precipitation, Rainfall intensity, Least squares method, Water resources, *Watershed management, *Oklahoma. Identifiers: *Multivariate statistics, *Discriminant analysis, Stepwise regression.

Similarity of hydrologic response using discriminant analysis and an iterative algorithm was used as a basis for regionalizing 4 peak flow rates from 90 stations in Oklahoma. Sixty stations were used to develop the equations and 30 were used as a test set. Three distinct regions were obtained; however, they were not geographically contiguous. Therefore, discriminant functions using watershed

characteristics as discriminators were used to define the regions. It can be shown that the inter-correlation of a group of dependent variables can be retained if the same set of independent variables is used in all equations. Therefore, since hydrologic continuity is important in the prediction of peak flow rates, all four peak rates, for each group, were predicted using linear multiple regression equations based on the same set of watershed characteristics: drainage area, mean an-nual precipitation, and the 2- and 100-year precipitation intensities. Peak rates of the 30 independent stations were also predicted by equations developed using conventional stepwise regression on the base set of 60 observations. Comparison of the results of the test data showed smaller standard errors of estimate and better hydrologic continuity using regionalized data and the same set of independent variables in the regression equations. W74 01174

HYDRODYNAMIC MODELING OF TWO--DIMENSIONAL WATERSHED FLOW, Illinois Univ., Urbana. Dept. of Civil Engineering. For primary bibliographic entry see Field 02A. 4-01278

COMPUTER UTILIZATION OF HYDROLOGI-CAL DATA FOR NORTH NASHWAAKSIS REPRESENTATIVE BASIN. New Brunswick Univ., Fredericton. Dept. of Civil

Engineering. For primary bibliographic entry see Field 07C. W74-01294

DATA ACQUISITION AND STORAGE FOR RESEARCH WATERSHEDS, Guelph Univ. (Ontario). School of Engineering. For primary bibliographic entry see Field 07C.

MOHAWK LAKE STUDY, BRANTFORD, ON-

For primary bibliographic entry see Field 02J. W74-01476

REVIEW OF PLANNING FOR THE GRAND RIVER WATERSHED.

For primary bibliographic entry see Field 05D. W74-01478

TALLAHALA CREEK LAKE, PASCAGOULA RIVER BASIN. MISSISSIPPI (FINAL ENVIRON-MENTAL IMPACT STATEMENT).

Army Engineer District. Mobile, Ala. For primary bibliographic entry see Field 04A. W74-01610

DESIGNATING A SEGMENT OF THE ST. CROIX AS PART OF WILD AND SCENIC RIVERS SYSTEM.

For primary bibliographic entry see Field 06E. W74-01619

TALLULAH CREEK WATERSHED (LONG CREED PORTION) GRAHAM COUNTY, NORTH CAROLINA (FINAL ENVIRONMEN-TAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from National Technical Information Service as EIS-NC-72-5512-F. \$4.25 in paper copy, \$1.45 in microfiche. September 1972. 42 p, 1 map,

Descriptors: *North Carolina, *Environmental effects, *Watershed management, Multiple purpose projects, Flood prevention, Water supply, Erosion control, Flood control, Recreation, Agriculture, Water resources development.

Identifiers: *Environmental impact statement, Robbinsville, N.C.

The Tallulah Creek Watershed (Long Creek Por-tion) is located in Graham County, North Carolina. Project measures include land treatment and one multiple-purpose structure for flood prevention multiple-purpose structure for flood prevention and water supply. The project will serve to reduce soil erosion, reduce sediment delivery, reduce sediment delivery to Santeetlah Lake, reduce flood damage greatly, improve the economic and social values, provide municipal and industrial water, provide 18 acres of fishing habitat, and pro-vide 1806 visitor-days of recreation. Adverse envide 1,806 visitor-days of recreation. Adverse environmental effects include loss of 36 acres of agricultural and forest land from production and upland game habitat, and the inundation of 4,000 feet of trout stream. Alternatives to the proposed project include the purchase of flood plain land, flood proofing, conservation land treatment, using Santeetlah Lake as an alternate source of mu-nicipal water supply, and leaving the area in its ex-isting condition. (Mockler-Florida) W74-01621

05. WATER QUALITY MANAGEMENT AND PROTECTION

CONCENTRATIONS OF PLUTONIUM, COBALT, AND SILVER RADIONUCLIDES IN SELECTED PACIFIC SEAWEEDS, Scripps Institution of Oceanography, La Jolla,

Calif

K. M. Wong, V. F. Hodge, and T. R. Folso Available from NTIS, Springfield, Va., 22151 as AD-741 997 for \$3.00 paper copy, \$1.45 microfiche. Report Nos. LA-4756, UC-41, December 1971. 6 p. 1 fig. 4 tab, 8 ref. Contract No. N00014-69-A-0200-6011.

Descriptors: "Absorption, "Marine algae, Marine animals, Radioisotopes, Cobalt, Metals, Heavy metals, Sea water. Algae, Grasses, Phaeophyta, Rhodophyta, Chlorophyta, Marine plants, Kelps, Bioindicators, "Cobalt radioisotopes, Radioactivity techniques, Analytical techniques, "Spectroscopy.

Identifiers: Co-60, Co-58, Pu-239, Ag-110m, Alpha spectrometry, Bioaccumulation, Gelidium, Macrocystis, Eisenia, Egregia, Zonaria, Sargassum, Phyllospadix, Aplysia californica, *Silver radionuclides, *Plutonium radionuclides, Sample preparation, Ashing, Biological mangification, Biological samples, Aplysia, *Seaweeds (Pacific Ocean)

The high uptake of radionuclides and the relative ease of sampling suggest that seaweeds may be ideal for monitoring certain radio-activities in the marine environment. Consequently, studies were undertaken to survey the concentrations of plu-tonium, radiocobalt, and radiosilver in several species of seaweeds collected along the coastal water of Southern California. Twelve species of seaweed were collected from five stations, sorted by species, washed, weighed, dried, and ashed. The ashed samples were dissolved in HNO3-HC1 and Pu-236 added as a radiochemical yield monitor. The plutonium was separated and purified by anion exchange column, electroplated onto a stain-less steel disk, and determined by alpha-spec-trometry. From preliminary results, it was concluded that all species of seaweeds concentrate plutonium and may be a sensitive indicator for the detection of variations of plutonium concentration in the marine environment; also, further work should be done to correlate plutonium concentration between seawater and algae, and a more comprehensive survey of the marine environment is needed. By comparing samples collected near the nuclear plant with samples of the same species on

Group 4D—Watershed Protection

other coastal collection sites no evidence of anomalous Pua239 was found near the plant, and definite evidence was found that Co-58, Co-60 and Ag-110m had been coming from the plant. By comparing different species collected near the nuclear plant, it was found that the red algae, Gelidium and Corallina, and a surf grass, Phyllospadix, accumulate higher concentrations of cobalt and silver radionuclides than did the brown algae. One species of sea hare, Aplysia californica, that is believed to prefer red algae as food also shows higher concentrations of Co-58, Co-60 and Ag-110m. Typical concentrations were: 2200, 180, 260 dpm/kg wet sample respectively. (Little-Battelle) W74-01297

5A. Identification of Pollutants

EVALUATION OF FLAME EMISSION DETER-MINATION OF PHOSPHORUS IN WATER, Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.

W. R. Seitz.
Copy available from GPO Sup Doc as EP1.23:660-2-73-007, \$0.50; microfiche from NTIS as PB-225 142/9, \$1.45. Environmental Protection Agency, Technology Series, Report EPA-660-2-73-007, August 1973. 18 p, 4 fig, 2 tab, 18 ref. EPA RAOP 16ADN-31.

Descriptors: *Phosphorus, *Phosphates, *Flame photometry, Phosphorus compounds, ganophosphorus compounds, Inorganic compounds, Analytical techniques, trophotometry, *Pollutant identification. Identifiers: *Flame emission spectrometry. *Spec-

NUCOR's flame spectrometer for phosphorus analysis was evaluated. Response to phosphorus in the form of H3PO4 was linear from 3 micro g/liter, the detection limit, to 120 mg/liter, the highest concentration tested. Metal ions depress phosphorus emission and must be removed by cation exchange prior to analysis. High concentrations (> or equal to 5 mg/liter) of sulfur interfere positively. Volatile phosphorus compounds produce a larger signal for a given phosphorus concentration than nonvolatile compounds. River water samples were spiked with inorganic and organic phosphorus and analyzed. The measured phosphorus concentrations were 10-25% lower in river water than in deionized water. (EPA) W74-01116

UTILIZATION OF REMOTE SENSING IN RIVER BASIN STUDIES,
Army Engineer Waterways Experiment Station,

Vicksburg, Miss.
L. E. Link, and A. Shindala.
Water Resources Bulletin, Vol 9, No 5, p 901-907, October 1973, 8 ref.

Descriptors: *Remote sensing, *Data collections, *River basin development, Water resources, Water pollution, *Water quality, Hydrogeology, Hydrologic data, *Pollutant identification.

Remote sensing techniques have the potential for significantly reducing the level of effort in a river basin water quality study. A general methodology is proposed for conduct of river basin water quality studies. The primary advantage is rapid evaluation of the water quality conditions of a river basin. Remote sensing techniques are a fundamental part of the methodology. The proposed methodology consists of two phases. Phase I deals with the study of the water resource characteristics of the basin as a system and identification of 'critical areas'. Phase II of the methodology involves the detailed study of the critical areas by means of computerized water quality simulation models. (Knapp-USGS)

SYMPOSIUM ON SIGNIFICANT RESULTS OB-TAINED FROM EARTH RESOURCES TECHNOLOGY SATELLITE-1, MARCH 5-9, 1973: VOLUME III--DISCIPLINE SUMMARY REPORTS.

For primary bibliographic entry see Field 07C.

ENVIRONMENT SURVEYS,

National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.

L. S. Walter. In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md, March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 47-56, p 47-56, May 1973. 2 append.

Descriptors: *Remote sensing, *Satellites (Artificial), *Monitoring, Environment, Path of pollutants, Data collections, Water pollution, Stripmines, Surveys, Erosion, Waste disposal. Identifiers: *ERTS.

The spectral and spatial resolution of the ERTS-1 sensors may be used to monitor and assess specific sources of air pollution. Density slicing was used in the identification of smoke plumes. It was possible to detect previously unreported emis-sion sources leading to possible law-enforcement applications. Smoke plumes over Lake Michigan were related to nucleation in snow showers. On a broader scale, atmospheric aerosol content and haze were studied, primarily with regard to their effect on the deterioration of signals from the earth's surface. Chemical discharge from a paper mill into Lake Champlain was detected. This information, along with numerous aircraft photo-graphs, is being used in court by the State of Vermont to affect a cease and desist order gainst the polluter located in New York State. Differences in sediment content within rivers, bays, lakes, and reservoirs are easily discernible. It is possible to monitor the location of dumping in oceans. Rate and extent of beach erosion can be evaluated through study of coastal circulation dynamics. Strip-mine and mine-dump investigations are also described. (See also W74-01163) (Knapp-USGS) W74-01167

PRODUCTION OF CRUSTACEAN ZOOPLANK-TON IN MOTY BAY, LAKE JEZIORAK: THE METHOD OF PRODUCTION ESTIMATION, Nicolas Copernicus Univ. of Torun, Ilawa (Poland). Dept. of Hydrobiology. For primary bibliographic entry see Field 02H. W74-01172

PRODUCTION OF CRUSTACEAN ZOOPLANK-PRODUCTION OF CRUSTACEAN ZOOPLANK-TON IN MOTY BAY, LAKE JEZIORAK: II.
ESTIMATION OF PRODUCTION OF THE PREDOMINATING SPECIES,
Nicolas Copernicus Univ. of Torun, Ilawa (Poland). Dept. of Hydrobiology.
For primary bibliographic entry see Field 02H.
W74-01173

SOME SOURCES OF ERROR IN THE 14C METHOD FOR ESTIMATING PRIMARY PRODUCTIVITY AND THEIR RELATIONSHIP TO LIGHT INTENSITY DURING INCUBATION, Kyoto Univ., Otsu (Japan). Otsu Hydrobiological

For primary bibliographic entry see Field 02H. W74-01217

DETERMINATION OF GRISEOFULVIN BY TIME-RESOLVED PHOSPHORIMETRY. Auburn Univ., Ala. Charles Richard Saunders Chemical Lab

Chemical Lao.
J. R. McDuffie, and W. C. Neely.
Analytical Biochemistry, Vol 54, No 2, p 507-512,
August 1973,. 2 fig, 18 ref. OWRR A-017-ALA (3).

Descriptors: Pollutants, *Fungi, *Pollutant identification

Identifiers: *Griseofulvin, *Dechlorogriseofulvin, metabolites, *Fungal *Phosphorimetry, Penicillium

Griseofulvin, an antibiotic, is a fungal metabolite produced by several species of pennicillium. Because of its use as an antibiotic, many procedures have been explored recently for the detection and determination of griscofulvin. Methods which have been used are based on glc and tlc, spectrophotometry, colorimetry and some luminescence. Of these methods, only the glc is a direct and easy way to differentiate between griseofulvin and a common contaminant, dechlorogriseofulvin. The phosphorescence lifetimes of griseofulvin and dechlorogriseofulvin are shown to be 0.11 sec and 1.16 sec, respectively. This tenfold difference is shown to enable the use of time-resolved phosphorimetry for the deter-mination of griseofulvin in mixtures with dechlorogriseofulvin. W74-01224

FOOD CONSUMPTION OF THE FREE-LIVING AQUATIC NEMATODE PELODERA CHIT-WOODI,

Auburn Univ., Montgomery, Ala. Dept. of Biolo-

B. K. Mercer, and E. J. Cairns.

Journal of Nematology, Vol 5, No 3, p 201-208,
July 1973. 4 fig, 4 tab, 21 ref. OWRR A-004-ALA

Descriptors: *Nematodes, *Aquatic animals, Invertebrates, *Food habits, Respiration, Bacteria. Identifiers: Calorimetry, Cartesian diver respirometer, *Pelodera chitwoodi, *Respirome-

A Cartesian diver respirometer was used to measure 02 uptake and respiratory quotients at 25C. Respiratory quotients were about 0.70 in starved nematodes, and 0.80 in third-stage and adult nematodes that had fed on bacteria. The energy output as measured by 02 uptake was inversely re-lated to the concentration of bacteria in the medium, indicating reduction in feeding effort. Feeding bacteria to third-stage nematodes in divers quickly resulted in peak respiration rates averaging 6.4 nl 02/micron g wet weight nematode per hour (Q02) or six times the endogenous rate. In about 4 hr, the rates fell and then stabilized at a Q02 of 2.5. Adult males fed bacteria in divers had a peak Q02 of 2.8 or twice the starved rate. Adult females fed bacteria had a peak Q02 of 3.7. Starving adult males and third-stage larvae were estimated to lose 2.4% and 1.4%, respectively, of their body weight per day in the form of fat based on the caloric equivalent of oxygen used and a respiratory quo-tient of 0.70. The caloric content of the bacteria fed to nematodes in divers was determined. It was then calculated that both third-stage larvae and males ingested bacteria equivalent to 4.4 X 0.00001 cal/micron g wet weight nematode tissue per hour when feeding. Of the bacterial calories in-gested, the larvae used 27% and adults 21% for respiration. It was estimated that males ingested 3.1 X 1,000,000 bacteria and females 10 X 1,000,000 bacteria during an 8-day life span. W74-01225

WATER. EXAMINATION. ASSESSMENT. CONDITIONING. CHEMISTRY. BACTERIOLOGY. BIOLOGY,

For primary bibliographic entry see Field 05F. W74-01236

THE CHARACTERISTICS OF THE RAW WATERS OF HASDEO RIVER AND DHENGUR NALA AT KORBA (M. P.), Fertilizer Corp. of India, Sindri. Planning and Development Div. G. S. Roy, C. D. Banerjee, G. S. Bhattacharyya, and B. K. Dutta.

Identification of Pollutants—Group 5A

Technol O Bull Plann Dev Div Fert Corp India.

rechnol Q Bull Fland Dev Div Fert Corp India. Vol 8, No 2, p 164-166. 1971. Illus. Identifiers: Dhengur Nala, Hasdeo River, *India (Korba-M.P.), *Minerals, Raw waters, River, *Water treatment, Alkalinity, Dissolved solids, Demineralization, Corrosion.

Investigations on the raw surface waters in the Korba region (Madhya Pradesh, India) carried out during April 1964-March 1965 revealed that the Hasdeo river and Dhengur nala waters are very soft with very low alkalinity, sulfate, chloride and dissolved solids contents but moderately high in silica. The low mineral content of these waters had certain inherent advantages and disadvantages. The main advantage is the low cost involved in their demineralization. The primary disadvantage is their high corrosivity requiring adequate treatment with lime of alum and lime in a conventional clarifier/softener to make them suitable as industrial cooling water or for domestic use.--Copyright 1973, Biological Abstracts, Inc. W74-01240

SOME OBSERVATIONS ON BACTERIAL POPULATIONS IN WILGREEN LAKE, MADIS-

ON, KY., Eastern Kentucky Univ., Richmond. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05B.

W74-01242

SURVIVAL OF COLIFORM BACTERIA IN NATURAL WATERS: FIELD AND LABORATO-STUDIES WITH MEMBRANE-FILTER CHAMBERS.

Montana State Univ., Bozeman. Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 05B.

W74-01250

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 4 AND 5. ST LAWRENCE RIVER BASIN AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS. Geological Survey, Washington, D.C.

For primary bibliographic entry see Field 02K. W74-01268

TECHNIQUES FOR MEASURING LIGHT AB-SORPTION SCATTERING, AND PARTICLE CONCENTRATIONS IN WATER, Environmental Research Inst. of Michigan, Ann

Arbor. For primary bibliographic entry see Field 07B. W74-01283

STORAGE AND PROCESSING OF WATER

QUALITY DATA, Department of the Environment, Ottawa (Ontario). Inland Waters Branch.

For primary bibliographic entry see Field 07C. W74-01293

REVISIONS AND NEW TAXA IN NEW ZEA-LAND NOTONEMOURIDAE (INSECTA: PLECOPTERA), For primary bibliographic entry see Field 02I. W74-01299

VARIATION OF ORGANOCHLORINE RESIDUE LEVELS WITH AGE IN GULF OF ST. LAWRENCE HARP SEALS (PAGOPHILUS GROENLANDICUS).

Bedford Inst., Dartmouth (Nova Scotia). R. F. Addison, S. R. Kerr, and J. Dale.

Journal of the Fisheries Research Board of
Canada, Vol 31, No 5, p 595-600, May 1973. 1 fig, 3 tab, 13 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Pesticide residues, *Polychlorinated biphenyls, Age, Size, Chemical analysis, Variability, Insecticides, Marine animals, Mammals, DDE, DDT,

cides, Marine animals, Mammals, DDE, DDT, Dieldrin, Pollutant identification, DDD, Statistical methods, *Gas chromatography.

Identifiers: *Harp seals, Electron capture gas chromatography, Animal tissues, Metabolites, Bioaccumulation, *Guif of St. Lawrence, Sample preparation, Data interpretation, Pagophilus groenlandicus, Blubber, Aroclor 1254, Gas liquid chromatography.

Blubber samples from 18 harp seals taken near the Seguenay River in the Gulf of St. Lawrence were analyzed for DDT metabolites, PCBs, and diel-drin. The concentration of total DDT and metabolites (sigma DDT) ranged from 3.1 to 22.6 ppm, PCBs (as Aroclor 1254) from 2 to 22 ppm, dieldrin from 0.1 to 0.3 ppm of blubber. Rank correlation of residue level and age indicated that sigrelation of residue level and age indicated that sig-nificant portions of the sigma DDT and PCB vari-ance could be assigned to increased residue levels with age. Within the sigma DDT group, DDE alone showed a strong proportional increase in concen-tration with age. Dieldrin concentration was not tration with age. Dieldrin concentration was not appreciably correlated with age. Among factors other than age, changes in blubber thickness did not account for any significant amount of the variance in blubber residue concentration. Examination of other published data suggested that parturition and/or lactation may cause reductions in blubber residue concentrations. (Holoman-Bat-W74-01300

18-ISOPRENOID KETONE IN RECENT MARINE SEDIMENT, California Univ., Los Angeles. Inst. of Geophysics

and Planetary Physics.
R. Ikan, M. J. Baedecker, and I. R. Kaplan.

Nature, Vol 244, No 5412, p 154-155, July 20, 1973. 2 fig. 1 tab. 8 ref.

Descriptors: *Bottom sediments, Methodology, Chemical analysis, Pollutant identification, *Organic compounds, Gas chromatography, Mass spectrometry, Aquatic soils, Soil analysis, Solvent extractions, Synthesis, *California.

extractions, Synthesis, "Cantornia. Identifiers: Natural organics, "Ketones, "Isoprenoids, Marine environment, "Tanner Basin (Calif), Sample preparation, 6 10 14-Trimethylpentadecan-2-one, Column chromatography, GC-mass spectrometry, Mass spectra, Thin layer chromatography, Hydrocarbons, Gas liquid chromatography.

A C18-isoprenoid ketone (6,10,14-trimethylpentadecan-2-one) has been isolated from Tanner Basin, Southern California continental shelf. Sam ples of sediments were sealed in glass bombs and exposed to temperatures from 60 to 150C for 7, 30, and 60 days. The sediment was then extracted with benzene-methanol and chromatographed on a sil-icic acid column. This compound was found in both heat-treated and untreated sediment from which it was extracted with the fatty acid fraction which had been converted to methyl esters, and was separated with the other branched ponents by the urea adduction method. A mass spectrum was obtained using a gas chromatograph coupled with a CEC-21-491 mass spectrometer. The identity of the ketone was further substantiated by in situ formation of a yellow 2.4dinitrophenylhydrazone on thin-layer plates. The measured R sub F value of 0.66 was the same as for the C18-isoprenoid ketone that was synthesized. The maximum ketone yield was obtained by heating the sediment sample at 150C for one month. (Holoman-Battelle) W74-01301

APPLICATION OF INFRARED FOURIER TRANSFORM SPECTROSCOPY TO ANALYSIS OF MICRO SAMPLES, Dow Chemical Co., Midland, Mich. Analytical

For primary bibliographic entry see Field 02K. W74-01303

MICRODETERMINATION OF CHLORO-S-TRIAZINES IN SOIL BY GAS-LIQUID CHRO-MATOGRAPHY WITH NICKEL ELECTRON CAPTURE OR ELECTROLYTIC CONDUCTIVI-TY DETECTION,

Hawaii Univ., Honolulu. H. Y. Young, and A. Chu. Journal of Agricultural and Food Chemistry, Vol 21, No 4, p 711-713, July/August 1973. 2 fig, 2 tab,

Descriptors: *Triazine pesticides, *Chlorinated hydrocarbon pesticides, *Pollutant identification, *Soil analysis, Herbicides, Chemical analysis, Methodology, Pesticide residues, Solvent extraction, Soil contamination, Water pollution sources, Separation techniques, "Gas chromatography. Identifiers: Atrazine, Propazine, Simazine, Electron capture gas chromatography, Electrolytic conductivity gas chromatography, Chemical recovery, Cleanup, Chloro-s-triazines, Selectivity, Sample preparation, Helemano soil, Kapaa soil, Hanalei soil, Gas liquid chromatography.

The method applied to the determination of chloro-s-triazine (simazine, atrazine, and propazine) residues in soil involves extraction with mixture of ethyl acetate and methanol and analysis by gas-liquid chromatography with nickel electron capture or electrolytic conductivity detection. Cleanup is necessary for the former but not the latter detector. Sensitivity is placed at 1 ng in the injected samples the least determinable concentration at 0.1 ppm of soil. The recovery values of chloro-s-triazines added to two Hawaiian soils were 84-112 percent using the EC detector and 88-110 precent using the CD detector. The application of this method to the analysis of water and river and ocean sediments is being tested. (Holoman-Battelle) W74-01304

TWO NEW CHYTRIDS FROM THE AP-PALACHIAN HIGHLANDS, Virginia Polytechnic Inst. and State Univ., Blacksburg, Dept. of Biology.

M.K. Roane.

Mycologia, Vol 55, No 3, p 531-538, May/June
1973. 14 fig, 5 ref.

Descriptors: Systematics, *Aquatic fungi, *Vir-Identifiers: *Chytridium ottariensis, *Phylc-

tochytrium powhatanesis, Phycomycetes.

Two new species of the Chytridiales have been isolated from water samples from the impound-ments on the Blue Ridge Scout Reservation in Pulaski County, Virginia. The first is a species of Chytridium, C. ottariensis, and the second is a Phlyctochytrium, P. powhatanensis. (Little-Battelle). W74-01305

AUTOMATIC SAMPLERS FOR SEWAGE AND

EFFLUENTS,
Oxford Sewage Works (England).
V. H. Lewin, and A. Latten.
Process Biochemistry, Vol 8, No 6, p 15-17, June 1973. 3 fig, 2 tab, 2 ref.

Descriptors: *Mechanical equipment, *Sewage effluents, *Sampling, Automatic control, Electrical equipment, Sewage, Waste water (Pollution), Reviews.

Identifiers: *Automatic samplers, Interval samplers, Proportional samplers.

A brief review is presented of available automatic samplers for sewage and effluents. These include sewage samplers, interval samples, a multipurpose sampler, a Luton type sampler, a U-tube sampler,

Group 5A-Identification of Pollutants

an impulse proportional sampler, a duckbill sampler, and others. (Little-Battelle) W74-01306

NATURAL DISPERSION OF MERCURY FROM PUHIPUHI, NORTHLAND, NEW ZEALAND, Massey Univ., Palmerston North (New Zealand). Dept. of Chemistry and Biochemistry. For primary bibliographic entry see Field 05B. W74-01307

REVISION OF FAMILY AND SOME GENERIC DEFINITIONS IN THE PHAENNIDAE AND SCOLECITHRICIDAE (COPEPODA: CALA-NOIDA),

New Zealand Oceanographic Inst., Wellington. Dept. of Scientific and Industrial Research. J. Bradford.

New Zealand Journal of Marine and Freshwater Research, Vol 7, Nos 1/2, p 133-152, June 1973. 4 fig, 2 tab, 58 ref.

*Systematics. Descriptors: *Copepods, *Zooplankton.

Identifiers: Scolecithrix, Amallothrix, Cornucalanus, Onchocalanus, *Phaenna, Racovitzanus, Scaphocalanus, *Scolecithricella, Scottocalanus, Xanthocalanus, Macroinvertebrates.

Some genera have been removed from the family Phaennidae which, with the Scolecithricidae, are redefined. All other genera have been placed close to the Diaixidae and Tharybidae. The scolecithricid genera Scolecithrix, Scolecithricella, Amallothrix, Scaphocalanus and Lophothrix are redefined. It is suggested that the species Scolecithrix ctenopus, S. autopecten, S. fowleri and Amallophora altera represent four groups of species which probably should be given generic status. A new species of Parundinella is named and a juvenile Neoscolecithrix described. (Little-Bat-W74-01308

NEW SPECIES OF BOECKELLA COPEPODA: CALANOIDA) FROM NORTHLAND, NEW ZEALAND, Waikato Univ., Hamilton (New Zealand). School

of Science.

New Zealand Journal of Marine and Freshwater Research, Vol 7, Nos 1/2, p 153-157, June 1973. 2 fig. 1 tab, 3 ref.

Descriptors: *Copepods, *Systematics, Lakes,

Identifiers: *New Zealand, *Boeckella tanea, Macroinvertebrates.

A new species of calanoid copepod, Boeckella tansa, shows similarities to B. propinqua and B. delicata. It appears to be confined to lakes and ponds in Northland, New Zealand. (Little-Bat-W74-01309

PROTOZOA FROM BLUE LAKE, RAOUL

ISLAND, Massey Univ., Palmerston North (New Zealand). Dept. of Microbiology and Genetics.
For primary bibliographic entry see Field 05C.
W74-01310

DIATOM FLORA OF THE GRAND RIVER, ON-TARIO, CANADA.

Waterloo Univ., (Ontario). Dept. of Biology. M. R. Sreenivasa, and H. C. Duthie. Hydrobiologia, Vol 42, Nos 2-3, p 161-224, August 15, 1973. 224 fig, 2 tab, 23 ref.

Descriptors: *Diatoms, *Hydrogen ion concentration, Alkalinity, Sampling, Varieties, Speciation, Water quality, Aquatic plants, Sediments, Systematics, Separation techniques, Aquatic algae, *Canada.

Identifiers: *Grand River (Canada), Sample preparation, *Cymbella caespitosa.

Samples of diatom flora were collected from 12 stations on the Grand River during 1965-70. Collections were made by plankton net, by scraping rocks, and by collecting leaves of whole aquatic plants. Sediments were collected with an Ekman dredge. Samples were boiled in a mixture of nitric and sulfuric acids, washed and centrifuged with distilled water, and mounted in hyrax or clearax for microscopic examination. Of 273 taxa identified the most abundant species overall were Cymbella caespitosa and Diatoma vulgare. Most of the species identified are common to moderately alkaline rivers and lakes in eastern and central North America. (Little-Battelle)

FIELD AND EXPERIMENTAL STUDIES ON THE EFFECTS OF A POWER STATION EFFLUENT ON TUBIFICIDAE (OLIGOCHAETA, ANNELIDA).

Central Electricity Generating Board, Ratcliffeon-Soar (England). Freshwater Biology Unit. For primary bibliographic entry see Field 05C.

THE DETERMINATION OF THALLIUM IN URINE AND PLASMA BY DELVES CUP ATOMIC ABSORPTION,

Illinois Univ., Urbana. Coll. of Veterinary

G. M. Shkolnik, and R. F. Bevill. Atomic Absorption Newsletter, Vol 12, No 5, p 112-114, September-October 1973. 4 fig, 1 tab, 8

Descriptors: *Pollutant identification, *Urine, Chemical analysis, Methodology, Metals. Identifiers: *Plasma, *Thallium, Delves cup, *Atomic absorption spectrophotometry, Body fluids, Biological samples, Sensitivity, Reproducibility. Sample size.

A rapid and accurate method is described for determining thallium in plasma and urine utilizing Delves cup atomic absorption. Microliter quantities of plasma and urine were pipetted into decontaminated Delves cups and dried at 150C. Hydrogen peroxide was added to the plasma samples to partially oxidize the organic material; these samples were again dried after oxidation. The Delves cup method is more sensitive than that reported by previous investigators. The sensitivity for 1 percent absorption is 0.7 ng for plasma and 0.6 ng for urine when 10-microliters samples of each are analyzed. The values obtained were comparable to those obtained by flame atomic absorption. The effect of background correction is discussed. (Holoman-Battelle)

DETERMINATION OF MERCURY AFTER ROOM TEMPERATURE DIGESTION BY FLAMELESS ATOMIC ABSORPTION,

A. Bouchard. Atomic Absorption Newsletter, Vol 12, No 5, p 115-117, September-October 1973. 8 tab, 7 ref.

Descriptors: *Mercury, *Pollutant identification, *Chemical analysis, *Plant tissues, *Chemical degradation, Urine, Methodology, Heavy metals, Fish, Vegetation, Organic matter, Eels, Shrimp,

Identifiers: *Sample preparation, *Flameless atomic absorption spectrophotometry, *Animal tissues, Biological samples, Environmental samples, Tuna, Haddock, Perch oil, Anchovy, Precision, Chemical digestion.

A new method for the digestion of organic materials has been developed and used for the determination of total mercury in organic samples. This procedure, which takes place at room temperature (25C), is based on the oxidizing power of chromic acid (CrO3) alone, or combined with red fuming nitric acid. The method has been applied successfully to samples of urine, fish and vegetation. Each sample was prepared following available procedures and the proposed method. Mercury determinations by flameless atomic absorption spectrophotometry were compared in each case. The results obtained using the proposed method were comparable in all cases to the other methods used. (Holoman-Battelle)

EVALUATION OF THE USE OF THE HEATED GRAPHITE ATOMIZER FOR THE ROUTINE DETERMINATION OF TRACE METALS IN

State Univ., Coll., Fredonia, N.Y. Dept. of Geolo-

W. M. Barnard, and M. J. Fishman.

Atomic Absorption Newsletter, Vol 12, No 5, p 118-124, September/October 1973. 7 tab, 10 ref.

Descriptors: *Trace elements, *Water analysis, Laboratory equipment, *Metals, Chemical analy-sis, Copper, Lead, Cadmium, Manganese, Chromium, Instrumentation, *Heavy metals, Chelation, Solvent extractions, Evaluation, Pollutant identification, Mercury, Water pollution, Methodology.

*Atomic Identifiers: absorption trophotometry, *Heated graphite atomizer, Sensitivity, Performance evaluation, Chemical concentration, Standard addition technique, Detection limits, Arsenic, Selenium, Graphite furnace.

Analysis of four standard reference water samples for Cu, Pb, Cd, Mn, and Cr by flameless atomic absorption spectrophotometry using a heated graphite atomizer permits an evaluation of the atomizer for the routine, practical analysis of water samples. Trace metals analysis of water by direct comparison with aqueous standards is impractical because of matrix interference. Analysis by combining a chelation and solvent extraction with subsequent atomization is effective for Cu, Pb, and Cr, but not for Cd and Mn. Analysis by standard additions appears to be reliable, but time consuming. The sensitivity of the atomizer for As, Hg, Se and certain other elements is too low for practical, routine determination of these elements in most natural waters. Although the heated graphite atomizer has high capability of sensitivity and detection limits for many elements and may have potential applications for specific problems encountered in water analysis, its use for determination of trace metals in waters of varied composition, especially by laboratories engaged in the analysis of large numbers of samples, is limited. (Holoman-Battelle) W74-01316

A COMPARISON OF FAST DESTRUCTION METHODS FOR THE DETERMINATION OF TRACE METALS IN BIOLOGICAL MATERI-

Brussels Univ. (England). Pharmaceutical Inst. S. Luyten, J. Smeyers-Verbeke, and D. L. Massart.

Atomic Absorption Newsletter, Vol 12, No 5, p 131-132, September-October 1973. 2 tab, 4 ref.

Descriptors: Methodology, *Metals, *Chemical degradation, *Copper, *Zinc, *Trace elements, Chemical analysis, Organic matter, Heavy metals, Pollutant identification, Pollutants.

Identifiers: Biological materials, *Atomic absorption spectrophotometry, Sample preparation, Biological samples, Animal tissues, Brain, Fish meal, Standard addition technique, Soluene method, Wet digestion, Pressure bottle method.

Identification of Pollutants-Group 5A

Two new procedures for the destruction of biological materials - soluene method and pressure bottle method - were applied to the determination of Cu and Zn in human brain tissue and in fish meal by atomic absorption spectroscopy. No significant differences were observed for the destruction procedures studied. Good results were obtained by the soluene method for brain tissue but the fish meal could not be dissolved in soluene. It was impossible to obtain a clear solution for brain tissue with the pressure bottle method, but it worked well in dissolving the fish meal. The soluene and pressure digestion methods do allow for fast and accurate analyses in some cases, but not all. (Holoman-Battelle)

MODIFIED FILTRATION METHOD FOR THE ANALYSIS SUSPENDED SOLIDS, OF WASTEWATER

Metropolitan Denver Sewage Disposal District No. 1, Commerce City, Colo.

H. M. Harada, Jr., G. H. Reid, E. R. Bennett, and K. D. Linstedt.

Journal Water Pollution Control Federation, Vol 45, No 9, p 1853-1858, September 1973. 2 fig, 4 tab,

Descriptors: *Suspended solids, *Waste water (Pollution), *Chemical analysis, *Pollutant identification, *Filtration, Methodology, Pollutants, Water analysis, Efficiencies.

Identifiers: Method evaluation, Asbestos mat, Fiber glass filter, Reproducibility, Abestos cream mat, Fiber glass disk mat.

A modified asbestos mat/fiber glass filter method has been presented for the analysis of suspended solids in wastewater process streams. A comparative evaluation was made between this method, the conventional asbestos mat, and the fiber glass disk method. From the standpoint of analytical performance the three mats compared favorably in terms of precision of measurement. All of the mats showed good reproducibility. For the raw wastewater samples, the individual samples were all within plus or minus 0.5 percent of the average for the asbestos cream mats. In all of the solids determinations, the individual results from each sample were within plus or minus 10 percent of the com-bined mean for all three types of filter media. Tests showed that the use of a combination filter mat facilitates considerably more rapid analysis for wastewater suspended solids than the two established methods used for comparison. With this improved analytical efficiency, there is no apparent loss of analytical accuracy. (Holoman-Battelle) W74-01318

HEAVY METALS IN WASTEWATER AND TREATMENT PLANT EFFLUENTS,

Interstate Sanitation Commission, New York. A. I. Mytelka, J. S. Czachor, W. B. Guggino, and H. Golub.

Journal Water Pollution Control Federation, Vol 45, No 9, p 1859-1864, September 1973. 1 fig, 3 tab,

Descriptors: "Waste water (Pollution), "Heavy metals, "Sewage effluents, "Chemical analysis," Pollutant identification, Treatment facilities, Interstate commissions, Water sampling, Water analysis, Connecticut, New Jersey, New York, Methodology, Copper, Zinc, Chromium, Lead, Iron, Nickel, Cadmium, Manganese, Mercury, Cobalt, Data storage and retrieval, Computers. Identifiers: *Atomic absorption spectrophotometry, Data interpretation, Silver, Detection limits

The findings are presented of the Interstate Sanitary Commission's (New York, New Jersey, and Connecticut) routine heavy metals analyses of mu-nicipal waste water treatment plants. All samples were collected by the Commission's personnel with nonmetallic equipment and stored in nonmetallic containers. The effluent and influent samples were all composite samples collected during the same 5- to 6-hr period. Concentrations of heavy metals in the waste water were determined by atomic absorption spectrophotometry. The results show that many plants receive and discharge heavy metals above prudent limits. In order to minimize the harmful effects of these heavy metals (and of those not discussed in this paper), state-of-the-art techniques must be implemented to achieve as close to 100 percent removal as possible before these metal enter the sewer system. This is especially important in the New York/New Jersey/Connecticut area, where com-bined sewer systems allow waste water to by-pass treatment plants and discharge, untreated, directly into the receiving waterways. (Holoman-Battelle) W74-01319

IMPROVED DISTILLATION METHOD FOR VOLATILE ACIDS ANALYSIS, Somerset Raritan Valley Sewerage, Somerville,

Journal Water Pollution Control Federation, Vol 45, No 9, p 1946-1951, September 1973. 1 tab, 11

Descriptors: *Distillation, Methodology, *Chemical analysis, *Pollutant identification, *Organic acids, Time, Temperature, Pollutants. Identifiers: *Volatile acids, Precision, Repeatabili-*Organic

ty, Standard methods, Chemical recovery, Acetic acid. Carbon dioxide evolution.

The direct distillation method for volatile acids given in 'Standard Methods' was studied to learn the reason for poor recovery and poor repeatability. As a result of this work, the poor recovery was attributed to hold-back of the volatile acid in the boiler and the poor repeatability to the CO2 formed. The CO2 collected in the distillate can vary widely because of temperature effects, geometry of the apparatus, and time conditions. In the standard procedure this variability affects the repeatability of the volatile acid value, because CO2 and volatile acids are analytically combined. A procedure is suggested by which both recovery and repeatability can be significantly improved. The proposed method requires less than 2 hr to carry out, gives a recovery of 97 percent, and a standard deviation of plus or minus 3.8 mg/l as acetic acid in the range of 0 to 1,000 mg/l. (Holoman-Battelle) W74-01322

LITERATURE ON MERCURY: AVAILABILITY OF ENGLISH TRANSLATIONS,

Geological Survey, Menlo Park, Calif. E. A. Jenne, and W. Sanders.

Journal Water Pollution Control Federation, Vol 45, No 9, p 1952-1971, September 1973. 2 tab, 280

Descriptors: *Bibliographies, *Mercury, Publica-tions, *Translations, Documentation, *Foreign research, "Chemical analysis, "Pollutant identifi-cation, Path of pollutants, Ecological distribution, Toxicity, Methodology, Aquatic environment, Soil environment, Mineralogy, Waste water (Pollution), Air environment, Instrumentation, Public health, Plant tissues, Chemical properties, Heavy metals, Water analysis, Geochemistry, Soil analy sis, Rocks, Fish, Sediments, Metal organic pesti-cides, Trace elements, Birds, Crayfish, Mollusks, Human diseases, Vegetation, Mineral water, Sca Human diseases, Vegetation, Mineral water, Sea water, Freshwater, Air pollution, Soil contamina-tion, Mussels, Epidemiology, Physical properties. Identifiers: Biotransformation, Biological sam-ples, Marine environment, Pollutant removal, Natural waters, Organomercury compounds, Mer-curials (Pesticides), Organometallics, Mercury radioisotopes, Hydrogeochemistry, Minamata dis-ease, Pollutant effects, Carcinogenicity, Methyl-

Alkylmercury. Phenylmercury pyrocatechol, Phenylmercury nitrate, Methylmer-cury nitrate, Body fluids, Seals (Animals), Eggs.

All references to published non-English language articles contained in five recent major reviews of mercury in the environment have been compiled. The availability, as of July 1, 1971, and the source of English translations is indicated in this compilation of 280 papers. Only 109 are available in English translation. A number of the references compiled are not listed in standard abstract journals and hence could not be verified. These references are primarily from the Japanese and Swedish literature. (Holoman-Battelle)

WASTEWATER CHARACTERIZATION OF SWEET POTATO PROCESSING,

North Carolina State Univ., Raleigh. N. V. Colston, and C. Smallwood, Jr.

Journal Water Pollution Control Federation, Vol 45, No 9, p 1972-1977, September 1973. 5 tab, 2

Descriptors: *Food processing industry, Waste water (Pollution), *Chemical analysis, *Water analysis, Chemical properties, Industrial wastes, Sweet potatoes, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Nitrogen, Phosphorus, Temperature, Hydrogen ion concentration, Venturi flumes, Instrumentation, Water sampling, *Pollutant identification, Solid wastes, *North Carolina.

Identifiers: *Cannery wastes, Characterization, *Sweet potato processing wastes, Unit processes, Settleable solids.

A study was conducted at a sweet potato processing plant in North Carolina during September through December 1971. The purpose of the research was to determine what waste loads were being produced in each of the unit processes throughout the cannery. The results indicated that 40 percent of the original input was yielded as sale-able merchandise. Water consumption in the plant amounted to 2,600 gal/ton of raw product input (10.8 cu m/metric ton) and biochemical oxygen demand, chemical oxygen demand, total solids, and suspended solids were, respectively, 60 lb (27.2 kg), 140 lb (63.5 kg), 160 lb (72.6 kg), and 30 lb (13.6 kg) per ton (0.907 metric ton) of product produced. (Holoman-Battelle) W74-01324

CHARACTERIZATION AND TREATABILITY OF POMACE STILLAGE, California Univ., Davis. Dept. of Civil Engineer-

T. H. Chadwick, and E. D. Schroeder. Journal Water Pollution Control Federation, Vol 45, No 9, p 1978-1984, September 1973. 1 fig, 5 tab,

Descriptors: *California, Chemical properties, *Waste water treatment, Physical properties,
*Waste identification, Sampling, Waste water
(Pollution), Chemical analysis, Industrial wastes, Chemical oxygen demand, Biochemical oxygen demand, Aerobic treatment, Anaerobic digestion, Biological treatment, Suspended solids, Hydrogen ion concentration, Acidity, Nitrates, Nitrites, Phosphates, Ammonia, Nitrogen, Pollutant

Identifiers: *Pomace stillage, *Winery wastes, Characterization, Distillery wastes, Loading rates, Orthophosphates, Polyphosphates, Volatile solids, Tartrates.

Washed pomace stillage from the Bear Creek Winery (California) was characterized and sub-jected to biological treatment and processes for solids removal. The pomace distilling material was a mixture of Tokay, Thompson, Seedless, Zinfandel, and Palomino grape skins, pulp, and seeds.

Group 5A—Identification of Pollutants

Samples were collected at 150 F and placed in plastic utility cans, lined with polyethylene bags, and frozen. Suspended solids, acidity, and pH were determined prior to freezing. Other constituents and characteristics measured were total and ammonia nitrogen, nitrate, nitrite, total phosphate, orthophosphate, polyphosphate, suspended and volatile solids, tartrate and total biological oxygen demand. The study showed that pomace stillage contains high concentrations of organic materials that can be oxidized easily under both aerobic and anaerobic conditions. A residual chemical oxygen demand of 1,000 to 2,500 mg/l existed; this was apparently nonbiodegradable. Loading rates for anaerobic digestion ranges from 0.46 to 1.38 kg/day/cu m, and acclimation over 5 to 7 days behave satisfactorily biologically, but some solids were lost in clarifiers. Chemical treatment of the stillage gave unsatisfactory effluents even at large chemical doses. (Holoman-Battelle) W74-01325

THE IMPORTANCE OF CHELATING AGENTS IN NATURAL WATERS AND WASTEWATERS, Missouri Univ., Columbia.

For primary bibliographic entry see Field 05B. W74-01326

THERMOPHILIC OSTRACOD: AQUATIC METAZOAN WITH THE HIGHEST KNOWN TEMPERATURE TOLERANCE, Oregon Univ., Eugene. Dept. of Biology. For primary bibliographic entry see Field 05C.

W74-01327

CRITICAL STUDY OF THE APCD-MIBK EXTRACTION SYSTEM FOR ATOMIC ABSORPTION

TION, Missouri Univ., Columbia. Dept. of Agricultural Chemistry.

S. R. Koirtyohann, and J. W. Wen. Analytical Chemistry, Vol 45, No 12, p 1986-1989, October 1973. 4 fig, 2 tab, 10 ref.

Descriptors: *Aqueous solutions, *Heavy metals, Hydrogen ion concentration, Copper, Zinc, Lead, Solvent extractions, Separation techniques, Methodology, Plant tissues, Pollutant identification.

Identifiers: *Ketones, *Carbodithioates, Solvent extraction systems, *Atomic absorption spectrophotometry, Sample preparation, *Atomic emission spectrophotometry, Organic solvents, Zn-65, Perchloric acid, Animal tissues.

A detailed study was conducted to explain the inconsistent results obtained when the APCD-MIBK extraction system was applied to complex samples such as plant or animal tissues. The aqueous phase containing sample or standard with or without radioisotope labeling was buffered with ammoni-um acetate and the pH adjusted to the desired value. Extractions were performed in separatory funnels shaken for I minute by hand. Atomic absorption and emission measurements were made on the separated organic phase. When the highest possible accuracy was required the organic phase was diluted to 10 ml with water-saturated MIBK. Atomic absorption response from metals extracted into methyl isobutyl ketone decreased as the pH of the aqueous phase prior to extraction was increased, in spite of the fact that the extraction efficiency was near 100 percent for all pH values used. The change in response was the same for copper, lead, and zinc. The difference was critically dependent on the nebulizer adjustment. The effect appears to be associated with nebulization and transport of the organic solvent to the flame, but no satisfactory explanation for the observa-tions were found. (Holoman-Battelle) W74-01329 NOVEL METHOD OF RAMAN DATA ACQUISITION.

Campinas Univ. (Brazil). Gleb Wataghin Inst. of Physics.

For primary bibliographic entry see Field 02K. W74-01330

AUTOMATED RAPID SCAN INSTRUMENT FOR SPECTROELECTROCHEMISTRY IN THE VISIBLE REGION, Naval Research Lab., Washington, D.C. Elec-

Naval Research Lab., Washington, D.C. Electrochemistry Branch. For primary bibliographic entry see Field 02K. W74-01331

CHEMICAL CONSTANTS OF METAL COM-PLEXES FROM A COMPLEXOMETRIC TITRA-TION FOLLOWED WITH ANODIC STRIPPING VOLTAMMETRY.

North Carolina Univ., Chapel Hill. School of Public Health.

M. S. Shuman, and G. P. Woodward, Jr. Analytical Chemistry, Vol 45, No 12, p 2032-2035, October 1973. 3 fig, 1 tab, 12 ref.

Descriptors: *Chemical analysis, *Pollutant identification, *Water analysis, Methodology, Estimating, Chelation, Cadmium, Heavy metals, Metals, *Volumetric analysis.

Identifiers: Conditional formation constants, Complexometric titration, *Anodic stripping voltammetry, *Metal complexes, *Ligands, Natural waters, Ethylenediaminetetraacetic acid, Metal chelates.

A method based solely on data obtained from a complexometric titration followed with anodic stripping voltammetry is developed which permits conditional formation constants of metal complexes to be estimated. This method was applied to ethylenediaminetetraacetic acid (EDTA) titrated with cadmium and gave a formation constant for CdEDTA that agreed well with values previously reported. It was observed that in addition to convective diffusion, chemical dissociation of the complex during pre-electrolysis contributed to stripping currents. A general diagnostic that evaluates the extent of such kinetic contributions to stripping voltammetry and that is based upon the complexometric titration is also presented. Estimation of the rate constant for dissociation of CdEDTA is made from these experiments. The method described above is a significant improvement both in accuracy and simplicity over stripping voltammetry procedures presently used for estimating formation constants of metals in natural water solutions. Both concentration of free ligands from the end point and information on chemical composition from the formation constants can be obtained from this titration. The composition of existing complexes can be inferred either from titration of the sample as received or from titrations carried out after selective and exhaustive constant potential electrolysis of a metal from solution. (Holoman-Battelle) W74-01332

SEMIINTEGRAL ELECTROANALYSIS: SHAPES OF NEOPOLAROGRAMS,
Trent Univ., Peterborough (Ontario). Dept. of

Chemistry.

M. Goto, and K. B. Oldham. Analytical Chemistry, Vol 45, No 12, p 2043-2050, October 1973. 12 fig, 2 tab, 8 ref.

Descriptors: *Electrodes, Analytical techniques, Methodology, *Electrochemistry, Lead, Cadmi-um, Iron, Mercury, Nickel, Oxygen, Zinc, Gases, Heavy metals, *Metals.

Identifiers: "Semiintegral electroanalysis, Mercury electrodes, "Neopolarograms, Transfer coefficients, Rate constants, Electrode reactions, Thallium, Indium, Rare earth elements.

'Neopolarograms' are graphs vs. potential of the semiintegral of the current which flows when a stationary electrode is progressively polarized in the presence of electroactive species. Theory is presented which predicts the shapes of neopolarograms for reversible electrode processes. For irreversible and quasireversible reactions, a concise relationship exists between potential, current, and the semiintegral of the current. The theory has been verified using the electrode reactions of Tl (plus), Pt (2 plus), Cd (2 plus), In (III), Fe (II), Hg2 (2 plus), Ni (2 plus), O2, and Zn (2 plus) at a mercury electrode. These studies demonstrate the value of semiintegral electroanalysis in the determination of electron number, transfer coefficients, and rate constants of electrode reactions. Four advantages of neopolarography are enumerated. (Holoman-Battelle)

ANION RESPONSES AND POTENTIAL FUNC-TIONS FOR NEUTRAL CARRIER MEMBRANE FLECTRODES.

ELECTRODES, North Carolina Univ., Chapel Hill. William R. Kenan, Jr. Lab. of Chemistry. For primary bibliographic entry see Field 02K. W74-01334

VERSATILE COMPUTER GENERATED VARIABLE ACCELERATING VOLTAGE CIRCUIT FOR MAGNETICALLY SCANNED MASS SPECTROMETERS. USE FOR ASSAYS IN THE PICO-

GRAM RANGE AND FOR ASSAYS OF STABLE ISOTOPE TRACERS, Washington Univ., St. Louis, Mo. Biomedical Computer Lab.

For primary bibliographic entry see Field 02K. W74-01335

PRACTICAL METHODS FOR DERIVATIZING AND ANALYZING BACTERIAL METABOLITES WITH A MODIFIED AUTOMATIC INJECTOR AND GAS CHROMATOGRAPH,

Genter for Disease Control, Atlanta, Ga.
J. B. Brooks, C. C. Alley, J. W. Weaver, V. E.
Green, and A. M. Harkness.
Analytical Chemistry, Vol 45, No 12, p 2083-2087,
October 1973. 5 fig, 8 ref.

Descriptors: *Gas chromatography, Laboratory equipment, *Clostridium, *Alcohols, *Organic acids, Pollutant identification, *Pathogenic bacteria, Methodology.

Identifiers: Metabolic products, Metabolites, beta-Phenylethylamine, Tryptamine, Isoamylamine, Putrescine, Lactic acid, alpha-Hydroxybutyric acid, alpha-Hydroxyisocaproic acid, alpha-Hydroxyvaleric acid, alpha-Hydroxycaproic acid, 1-Hexanol, 2-Hexanol, 1-Heptanol, Derivation.

A Perkin-Elmer Model 900 gas chromatograph, equipped with an electron capture detector and a Hamilton Autosampler, has been modified to permit automatic injection and analysis of a variety of important bacterial metabolic products. The Autosampler was modified to correct leak problems connected with the inlet system, and a microswitch was installed to permit temperature programming. The gas chromatograph was modified by adding a Beckman switching valve that permits use of two columns (polar and non-polar) at different time intervals through the same detector or the venting of undesirable compounds. In order to convert the Model 900 gas chromatograph equipped with an autosampler into a two-column system, an injector block through which samples could be injected manually was added to the system. The system was tested by analyzing HFBA derivatives prepared from pH10 chloroform extracts of Clostridium sordelli and C. bifermentans incubated on cooked meat and standard mixtures of acids and alcohols. (Little-Battelle)

Identification of Pollutants—Group 5A

INVESTIGATION OF SPECTRAL OVERLAP OF THE NEON 359.352-NM AND CHROMIUM 359.349-NM SPECTRAL LINES IN ATOMIC ABSORPTION AND ATOMIC FLUORESCENCE SPECTROMETRY OF CHROMIUM, Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry. For primary bibliographic entry see Field 02K. W74-01337

INDIRECT COULOMETRIC TITRATION OF BIOLOGICAL ELECTRON TRANSPORT COM-PONENTS.

Ohio State Univ., Columbus. Dept. of Chemistry. For primary bibliographic entry see Field 02K.
W74-01338

SIMPLE INEXPENSIVE FREEZE-DRVING PROCEDURE, Bureau of Alcohol, Tobacco and Firearms, Cin-

cinnati. Ohio.

For primary bibliographic entry see Field 07B. W74-01339

ETHYLENETHIOUREA DEGRADATION, FMC Corp., Princeton, N.J. Niagara Chemical

For primary bibliographic entry see Field 05B. W74-01340

LATERAL DIFFUSION INTERFERENCES IN FLAME ATOMIC ABSORPTION AND EMIS-SION SPECTROMETRY,

Ames Lab., Iowa. For primary bibliographic entry see Field 02K. W74-01342

DETECTOR FOR ION-EXCHANGE

NEW DETECTOR FOR ION-EACHANGE CHROMATOGRAPHY, Cincinnati Univ., Ohio. Dept. of Chemistry. T. W. Gilbert, and R. A. Dobbs. Analytical Chemistry, Vol 45, No 8, p 1390-1393, July 1973. 4 fig, 2 tab, 11 ref.

Descriptors: *Anions, *Cations, *Heavy metals, Sodium, Potassium, Cesium, Magnesium, Calcium, Maganese, Iron, Cobalt, Nickel, Copper, Cadium, Mercury, Aluminum, Strontium, Zinc, Chromium, Fluorides, Chlorides, Bromides, Iodides, Nitrates, Sulfates, Carbonates, Laboratory equipment, Water analysis, Aqueous solutions. Identifiers: *Ion exchange chromatography, Ion exchange membranes, Lithium, Rubidium, Silver, Barium, Cyanides, Tartrates, Citrates, Acetates, Detectors, Sensitivity, Chlorates, Bromates, Iodates, Perchlorates, Uranyl, Thicoyanates, Ammonium, Tin. Descriptors: *Anions, *Cations, *Heavy metals, monium. Tin.

A thermomechanical analyzer is used to measure the linear dimension change in membrane length as a function of the time or effluent volume. Peak heights or areas caused by the sorption and desorption of ions are used for quantitative deterdesorption of ions are used for quantitative determinations. Cation test solutions studied were-chlorides of Li, Na, K, Rb, Cs, NH4, Et4N, Mg, Ca, Sr, Ba, Mn, Co, Ni, Cu, Cd, Hg, Sn, and Al; nitrates of Ag, Zn, and UO2; and perchlorates of Cr and Fe. Anions investigated were F, Cl, Br, I, SCN, CN, NO3, C2H302, CL03, BRO3, IO3, C104, SO4, CO3, C4H606, and C6H507. Fundamental characteristics of the cation and anion membranes used are presented. Application of the detector in the separation of both cationic and anionic species is demonstrated. (Little-Battelle) W74-01343

FLUOROMETRIC QUANTITATION OF GALLI-UM IN BIOLOGICAL MATERIALS AT NANO-

GRAM LEVELS, Research Triangle Inst., Durham, N.C. For primary bibliographic entry see Field 02K. W74-01344

PREVENTION OF SELENIUM INTERFERENCE WITH MEASUREMENT OF PHOSPHATE AS ITS MOLYBDENUM (V-VI) COMPLEX.

New South Wales Dept. of Agriculture, Rydal-(Australia). Biological and Chemical Research Inst.

P. J. Milham, and C. C. Short.

Journal of the Association of Official Analytical Chemists, Vol 56, No 4, p 882-885, July 1973. 2 fig,

Descriptors: *Phosphates, *Plant tissues, Measurement, Chemical analysis, Chemical degradation, Catalysts, Pollutant identification,

tion, Catalysts, Poliutant identification, Methodology. Identifiers: *Selenium, *Chemical interference, *Phosphomolybdates, Complexation, Reproduci-bility, Selenocyanates, Sample preparation.

Selenium used as a catalyst in Kjeldahl digests of plant samples was found to interfere with an auto-mated molybdenum blue technique for determination of phosphate. Interference was prevented by formation of selenocyanate in the presence of excess cyanide. No modification of the apparatus was required and the rate of analysis was unchanged from 40 sampler/hr. Reproducibility of the modified technique was good and results were not signigicantly different (P equals 0.01) from those obtained by a manual molybdovanadate procedure. (Holoman-Battelle) W74-01345 tion of phosphate. Interference was prevented by

NEW RECORDS OF SARGASSUM HAWAIIEN-SIS DOTY AND NEWHOUSE (SARGAS-SACEAE, PHAEOPHYTA), A DEEP WATER SPECIES.

Hawaii Univ., Honolulu. Dept. of Botany. For primary bibliographic entry see Field 02I. W74-01349

SUBLITTORAL BENTHIC MARINE ALGAE OF SOUTHERN CAPE COD AND ADJACENT ISLANDS: PSEUDOLITHODERMA PARADOX-UM SP. NOV. (RALFSIACEAE, ECTOCAR-PALES),

Massachusetts Univ., Gloucester. Marine Station. J. R. Sears, and R. T. Wilce. Phycologia, Vol 12, Nos 1/2, p 75-82, June 1973. 15 fig, 2 tab, 11 ref.

*Benthic flora, *Phaeophyta, Descriptors: Marine algae, "Speciation, "Cytological studies, Sampling, Systematics, Kelps, Cultures, Plant morphology.

Identifiers: *Pseudolithoderma paradoxum, Sublittoral, Sample preparation, Pseudolithoderma roscoffensis, Pseudolithoderma sub-extensum, Pseudolithoderma sub-extensum, Pseudolithoderma extensum, Pseudolithoderma sub-extensum, Pseudolithoderma extensum, Pseudolithoderma (Sorapion, Ralsia, Symphyocarpus.

Pseudolithoderma paradoxum is described as a new crustose member of the Ralfsiaceae, Ectocarpales, based on year-round observation of field collected and laboratory cultured plants. The terminal unilocular sporangia, soft character, presence of six to nine plastids in each vegetative cell, and the absence of a gel covering distinguish P. paradoxum from other brown crustose algae. (Holoman-Battelle)

TEMPERATURE SELECTION BY JUVENILE AND ADULT YELLOW PERCH (PERCA FLAVESCENS) ACCLIMATED TO 24 C, Waterloo Lutheran Univ. (Ontario).

R. W. McCauley, and L. A. A. Read. Journal of the Fisheries Research Board of Canada, Vol 30, No 8, p 1253-1255, August 1973. 1 tab. 7 ref.

Descriptors: *Perches, *Water temperature, *Bioassay, *Age, Freshwater fish.
Identifiers: *Temperature selection.

Samples of juvenile and adult yellow perch (Perca flavescens) were obtained from the same habitat and at the same time from two separate water sources to study the differences, if any, in their preferred temperatures. The fish, acclimated to 24C, were subjected to a vertical temperature gradient. Juveniles selected temperatures in the range 20.0-23.2C and adults in the range 17.6-20.1C. It is concluded that age plays an important role in temperature selection in this species. (Little-Battelle W74-01353

SOLVENT EXTRACTION OF METAL 1,10-PHENANTHROLINE COMPLEXES AND CON-CENTRATION OF TRACE AMOUNTS OF METAL IONS PRIOR TO SPECTROPHOTOMETRIC OR FLAME PHOTOMETRIC DETERMINATION, Northern Illinois Univ., DeKalb. Dept. of Chemis-

A. A. Schilt, R. L. Abraham, and J. E. Martin. Analytical Chemistry, Vol 45, No 11, p 1808-1811, September 1973. 2 fig, 3 tab, 5 ref.

Descriptors: *Ions, *Separation techniques, *Pol-Descriptors: Yons, "Separation techniques, "You lutant identification, "Aqueous solutions, Metals, Solvent extractions, Spectrophotometry, Flame photometry, Zinc, Iron, Water analysis, Pollutants, Anions, Nitrates, Chlorides, Lead, Cadmium, Hydrogen ion concentration, Magnesium, Titanium, Chromium, Molybdenum, Maganese, Cheli Nitrat Conservations, Maganese, Cheli Nitratant, Maganese, Magane

Cobalt, Nickel, Copper, Chemical analysis.

Identifiers: *Phenanthroline, Preconcentration,
*Metal complexes, *Nitrobenzene, Trace levels,
Organic solvents, Extraction efficiency, Sample preparation, Reagents, Complexing agents, Perchlorates, Lauryl sulfate, Lithium, Vanadium, Silver, Thallium, Tin, Bismuth, Atomic absorption spectrophotometry, Sensitivity.

The use of 1,10-phenanthroline as an extraction reagent to facilitate separation and concentration of metal ions prior to their determination has been investigated. Various solvents, anions, and solution conditions were evaluated to discover optimum conditions and procedures for quantitative extractions. Distribution ratios, extraction efficiencies, and identities of extracted complexes were deter-mined for a number of selected metal ions. The effectiveness of 1,10-phenanthroline as an extraction reagent was demonstrated by its application to determine trace amounts of zinc and iron in water. Nitrobenzene was not only effective as an extrac-tion solvent but also suitable as an aspiration sol-vent for flame spectrometry. (Holoman-Battelle) W74-01354

SIMPLE DIRECT COMBINATION OF GAS CHROMATOGRAPHY AND VAPOR PHASE IN-FRARED SPECTROMETRY,

J. E. Crooks, D. L. Gerrard, and W. F. Maddams. Analytical Chemistry, Vol 45, No 11, p 1823-1827, September 1973. 2 fig, 1 tab, 13 ref.

Descriptors: *Gas chromatography, *Laboratory equipment, *Analytical techniques, *Organic compounds, Instrumentation, Methodology, Research equipment, Chemical analysis, Spectrometers, Pollutant identification.

Identifiers: *Vapor phase infrared spectrometry, Performance evaluation, *Infrared spectra, Sensitivity, Hydrocarbons.

A combined gas chromatography/infrared spec-trometry system is described which is based, as far as possible, on the equipment to be found in a smaller spectrometry laboratory, for use by staff who do not specialize in infrared spectrometry. The components of a sample are separated by gas chromatography and are passed separately into a heated multireflection gas cell. A spectrum is obtained for each component, using conventional scanning conditions, and while the spectrophotometer is running, the flow of carrier gas through the column is stopped. When the spectrum

Group 5A-Identification of Pollutants

of a particular component has been obtained, the carrier gas flow is resumed and the next component passes into the cell. Spectra may be obtained for as many as five components in one sam-ple without seriously impairing the column resolution. Useful spectra are obtained from 100-microgram quantities of most organic compounds which, for a total sample size of 10 microliters, permits examination of components down to the 1 percent level. The system is readily assembled and the constituent gas chromatograph and infrared spectrometer may be used for other analytical work. (Holoman-Battelle) W74-01355

DETERMINATION OF LOW CONCENTRA-TIONS OF COBALT IN PLANT MATERIAL BY ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Western Australia Univ., Nedlands. Inst. of

For primary bibliographic entry see Field 02K. W74-01356

PRECOLUMN INLET SYSTEM FOR THE GAS CHROMATOGRAPHIC ANALYSIS OF TRACE QUANTITIES OF SHORT-CHAIN ALIPHATIC AMINES.

Agricultural Research Service, Fort Collins, Colo.

C. E. Andre, and A. R. Mosier. Analytical Chemistry, Vol 45, No 11, p 1971-1973, September 1973. 2 fig, 1 tab, 10 ref.

Descriptors: *Gas chromatography, *Chemical analysis, Methodology, *Aqueous solutions, *Pollutant identification, Organic compounds, Nitrogen compounds.

Identifiers: *Aliphatic amines, *Trace levels, Linearity, Reproducibility, Sensitivity, Amines, Monomethylamine. Dimethylamine. Trimethylamine, Monoethylamine, Diethylamine, Isopropylamine, n-Propylamine, N-Butylamine, Isobutylamine, sec-Butylamine, Flame ionization gas chromatography, n-Amylamine, tert-Butylamine.

A gas chromatographic system is described that is capable of analyzing aqueous solutions of salts of short-chain aliphatic amines. A standard GC inlet modified with the Ascarite precolumn described provides the reproducibility, sensitivity, and convenience necessary for routine analyses. Because the Teflon reactor tube is easy to inspect and because it is not part of the column, routine replacement involves no more work than changing a septum. The analytical procedure which utilized a gas chromatograph equipped with a dual flame ionization detector is similar to that used for the analysis of any liquid sample. To ensure reproducibility, the precolumn inlet tubes were changed after 75 to 100 five-microliter injections. Quantitative information was obtained using peak height. Reproducibility of the system was determined using 5 and 50 ppm monomethylamine and 20 ppm isopropylamine. The relative standard deviations were respectively 3.39, 1.97, and 3.39 percent. Linearity in the 5-50 ppm working range was confirmed by a linear regression coefficient signifi-cant at the 0.1 percent level. (Holoman-Battelle) W74-01357

A SYSTEMATIC STUDY OF THE VARIABLES INVOLVED IN THE REVERSE-PHASE THIN-LAYER CHROMATOGRAPHY OF OXYETHY-LATED ALKYL SULFATE SURFACTANTS, Beaver Coll., Glenside, Pa.

A. C. Breyer, M. Fischl, and E. J. Seltzer. Journal of Chromatography, Vol 82, No 1, p 37-52, July 18, 1973. 7 fig, 15 tab, 26 ref.

Descriptors: *Separation techniques, *Pollutant identification, Temperature, Humis Methodology, Iodine, *Surfactants, *Sulfates.

Identifiers: Anionic surfactants, *Thin layer chromatography, Oxyethylated alkyl sulfates, Chromogenic reagents, Organic solvents, Adsor-Rhodamine B, Rhodamine 6G, resol green, Silver nitrate, Sodium Bromocresol green, Silver nitrate, Sodiu fluoresceinate, Sulfuric acid, Pinacryptol yellow.

Reverse-phase thin-layer chromatography was used to separate a homologous series of oxyethylated alkyl sulfate surfactants derivable from waste animal fats. The separations were designed on the basis of a systematic study of the variation in the R sub F values and spot shapes and areas of the anionic surfactants with the major variables of the chromatographic system. The best separations were obtained with commercially available glass plates covered with a 250-microgram layer of Alumina H, Alumina G or Silica Gel G impregnated with a 3-5 percent (v/v) solution of n-dodecanol ethanol, at 15-30 degrees using tanks pre-equilibrated and developed with a 3:2 (v/v) methanol-ammonia solution solvent system. The use of pinacryptol yellow (0.05 percent w/v in water) together with an ultraviolet viewing chamber was found to be the most satisfactory spot detection procedure. Sample sizes of 0.1-10 micrograms in 0.5-2.0 micrograms of solution were applied with a Hamilton syringe or capillary micropipets 2 cm above the base of the plate. A 100-ml volume of solvent was added to the tanks and the solvent was permitted to run a distance of 15 cm from the spotting line. The present study lays the foundation for effecting excellent separations of other homologous series of anionic surfactants. (Holoman-Battelle) W74-01358

EMERGENCE. REPRODUCTION. GROWTH OF SETIPALPIAN PLECOPTERA IN SOUTHERN ONTARIO,

Waterloo Univ. (Ontario).

P. P. Harper. OIKOS, Vol 24, No 1, p 94-107, 1973. 23 fig, 3 tab,

Descriptors: *Stoneflies, *Life cycles, *Life history studies, *Reproduction, *Growth stages, Sampling, Streams, Growth rates, Hatching, Size,

Identifiers: Emergence, Isoperla, Alloperla, Hastaperla, Perlesta, Acroneuria, Phasganophora, Paragnetina, Neoperla, Alloperia (Sweltsa).

Plecopteran nymphs were collected at monthly intervals for one year from 11 streams in southern Ontario to study their emergence, reproduction, and growth. Samples were collected from riffles by hand picking, netting, and by using emergence traps. Of 81, 372 stonefly nymphs collected, 6 207 or about 7.6 percent were Setipalpia. The Perlodidae were represented by eight species of Isoperla: I. nana, I. decepta, I. transmarina, I. clio, I. cotta, I. frisoni, I. dicala, and I. lata. Chloroperlidae were represented by two species: Alloperla (Sweltsa) onka and Hastoperla brevis. Perlidae were represented by six species: Perlesta placida, Acroneuria carolinensis, Phasganophora capitata, Paragnetina media, Neoperla clymene, and Acroeuria evoluta. Only seven species occurred in sufficient numbers to permit a study of their life cycle. Special emphasis was given in the study to the biology of the eggs, the younger nymphs, and the adults. The results show that Isoperla clio, I. transmarina, I. cotta, and I. frisoni are univoltine with a simple and straight forward life history. There is, however, in some species a differential growth of the nyphs which results in a wide siaerange of the nyphs at any one time. The chloroperlid Alloperla onkos has a two-year cycle. The per-Paragentina media and Phasganophora capitata require three and two years respectively to complete their cycle. Pharthenogensis is reported in P. media. (Little-Battelle)
W74-01359 A PROCEDURE FOR THE ESTIMATION OF MICROGRAM QUANTITIES OF TRITON X--100.

McGill Univ., Montreal (Quebec). Dept. of Biochemistry. H. S. Garewal.

Analytical Biochemistry, Vol 54, No 2, p 319-324, August 1973. 2 fig, 1 tab, 10 ref.

Descriptors: *Methodology, *Estimating, *Spectrophotometry, *Pollutant identification, Chemical analysis, Color reactions, Assay, Proteins, Ions, *Detergents,
Identifiers: *Trace levels, Nonionic detergents,

Triton X-100, Nonionic surfactants, Chemical interferences, Octylphenoxypolyethoxyethanol.

A spectrophotometric procedure is reported for the assay of microgram amounts of the nonionic detergent Triton X-100. The method is based on the reaction of ammonium cobaltothiocyanate with the poly (ethylene oxide) groups of Triton X-100 to form a blue precipitate. The latter is extracted into ethylene dichloride and assayed spectrophotometrically. Capable of assaying as little as 40 micrograms of Triton X-100, the procedure is applicable in the presence of proteins provided a small easily determined correction is applied. High ionic strength (up to 2 M NaCl tested) did not interfere with the method. (Holoman-Battelle)

SIMULTANEOUS DETERMINATION OF MAN-GANESE, COPPER, ARSENIC, CADMIUM, AN-TIMONY AND MERCURY IN GLACIAL ICE BY RADIOACTIVATION,

Naval Undersea Center, San Diego, Calif.

H. V. Weiss, and K. K. Bertine.

Analytica Chimica Acta, Vol 65, No 2, p 253-259, July 1973. 1 fig, 2 tab, 2 ref.

Descriptors: *Neutron activation analysis. *Heavy metals, *Chemical analysis, *Radioactivity techniques, *Pollutant identification, Manganese, Copper, Cadmium, Mercury, Ice, Separation techniques, Gamma rays, Irradiation,

Methodology.
Identifiers: *Glacial ice, Sample preparation, *Multielemental analysis, Mn-56, Cu-64, Arsenic, As-76, Sb-122, Antimony, Hg-197, Cd-115, In-115, Chemical concentration, Detection limits, Trace

A method was developed to measure simultaneously the concentration of the elements manganese, copper, arsenic, cadmium, antimony, and mercury in glacial ice. Samples and comparators were irradiated for 60 min in a thermal flux of 1.8 billion n/sq cm/s. The six elements were separated from the irradiated samples sequentially; mercury, arsenic, and cadmium received additional radiochemical purification. The gamma-rays of the Mn-56, Cu-64, As-76, Sb-122, and Hg-197 and the beta rays of the Cd-115-In-115 were measured. All the elements were detectable at the subnanogram level. Comparison of the detection limits with the concentration of elements in the samples indicated that, even with the moderate neutron flux available and for ice from a relatively uncontaminated environment, the methods used were sensitive enough for adequate characterization. (Holoman-Battelle) W74-01361

THE DETERMINATION OF LEAD AND NICKEL BY ATOMIC-ABSORPTION SPEC-TROMETRY WITH A FLAMELESS WIRE LOOP ATOMIZER,

Louisiana State Univ., New Orleans. Dept. of Chemistry.
J. V. Chauvin, M. P. Newton, and D. G. Davis.

Analytica Chimica Acta, Vol 65, No 2, p 291-302, July 1973. 6 fig, 4 tab, 32 ref.

Identification of Pollutants-Group 5A

Descriptors: *Lead, *Nickel, *Pollutant identification, Methodology, *Aqueous solutions, Op-timization, Heavy metals, Anions, Cations, Temperature, Pollutants, Wavelengths, Flow rates, Gases, Absorption, Chemical analysis.

*Atomic absorption Identifiers: Identifiers: *Atomic absorption spec-trophotometry, Flameless wire loop atomizer, Ionic interference, Sample size, Sensitivity, Detection limits, Chemical interference, Vaporization, Slit width.

In an extension of studies of flameless atomizers for atomic-absorption spectrometry, an electrically heated tungsten-rhenium alloy wire loop was examined. Reduction of metallic salts to groundstate metal atoms was accomplished with the high temperature produced by the loop. Experimental parameters such as wavelength, slit width, atomization temperature and sheathing gas flow rate were optimized. Aqueous solutions of lead and nickel were analyzed by this method using 2microliter aliquots. Nickel was investigated as a representative less volatile metal. Absolute detection limits of 66 and 12 ng, and absolute sensitivities of 70 and 800 ng of lead, were established for unenclosed and enclosed cells, respectively. An absolute detection limit of 1.6 ng and an absolute sensitivity of 90 ng of nickel were obtained. Inter-ference studies of lead using 20 cations and 16 anions showed that no straightforward correlation could be found between interference and any one physical property considered. Solubility problems had some effect on the anion studies especially with phosphate, sulfate, hydrogencarbonate, and acetate. Foreign cations generally enchanced the lead absorption by retarding its vaporization, allowing the slow detection system to respond more efficiently. (Holoman-Battelle) W74-01363

EXTRACTION-PHOTOMETRIC DETERMINA-TION OF URANIUM CHLOROPHOSPHONAZO-III. (IV)

Japan Atomic Energy Research Inst., Tokai.

T. Yamamoto.

Analytica Chimica Acta, Vol 65, No 2, p 329-334, July 1973. 3 fig, 3 tab, 9 ref.

Descriptors: *Solvent extractions, *Pollutant identification, "Spectrophotometry, Methodology, Chemical analysis, Separation techniques, Heavy metals, Chemical reactions, Cations, Anions, Alkaline earth metals, Photometry, Sulfates, Phosphates, Nitrates, Chromium, Copper, Iron, Time, Acidity, Stability, Molybdenum, Aluminum, Calcium, Magnesium,

"Chlorophosphanzo-III, Molar absorptivity, Chemical interference, Absorption spectra, Precision, Rare earth elements, Oxalates, Thorium, Zirum, Niobium, Barium, Cerium, Lanthanum, Perchlorates.

A sensitive spectrophotometric method has been developed for the determination of uranium. The uranium (IV)-chlorophosphonazo-III complex is extracted into 3-methyl-l-butanol from 1.5-3.0 M hydrochloric acid solution. Maximal absorbance occurs at 673 nm and Beer's law is obeyed over the range of 0-15 micrograms per 10 ml of the organic phase. The molar absorptivity is 121,000 1/mole/cm. Uranium can be determined in the presence of fluoride, sulfate and phosphate. Nitrate ion and elements (chromium, copper, iron) which affect the reduction of uranium (IV) or stability of uranium (IV) interfered. The absorbance of the uranium (IV)-chlorophosphonazo-III complex in the organic phase did not change for at least 2 h at room temperature. The relative standard deviation was plus or minus 2.2 percent for 10 determinations of 10 micrograms of uranium. (Holoman-Battelle) W74-01364 **EVALUATION OF THE ACCURACY OF GRAN** PLOTS BY MEANS OF COMPUTER CALCULA-TIONS. APPLICATION TO THE POTEN-TIOMETRIC TITRATION OF THE TOTAL AL-KALINITY AND CARBONATE CONTENT IN SEA WATER, Goteborg Univ. (Sweden). Dept. of Analytical

For primary bibliographic entry see Field 02K. W74-01365

SEPARATION OF POLYPHOSPHATES BY PAPER CHROMATOGRAPHY WITH A NEW SOLVENT,

Tennessee Valley Authority, Muscle Shoals, Ala. Div. of Chemical Development.

T. C. Woodis, Jr., J. R. Trimm, and R. D. Duncan. Analytica Chimica Acta, Vol 65, No 2, p 469-473, July 1973. 5 tab, 3 ref.

Descriptors: *Solvents, *Separation techniques, *Pollutant identification, *Phosphates, Hydrogen ion concentration, Temperature

Identifiers: *Paper chromatography, Sodium tripolyphosphate, Hexammonium tetrapolyphosphate, Pentapolyphosphates, Hex-Heptapolyphosphates, Oc-Orthophosphates, apolyphosphates, tapolyphosphates, Pyrophosphates, Tripolyphosphates, Tetrapolyphosphates.

Study of the effect of solvent pH on chromatographic separation of polyphosphates led to development of a new solvent with a pH of 4. The solvent consists of 50 g of monochloroacetic acid, 250 ml of isopropanol, 350 ml of acetone, 300 ml of water, 100 ml of 25 percent EDTA solution, and 15 ml of concentrated ammonia liquor. The solvent did not give a blue front on chromatograms of sodium tripolyphosphate and hexammonium tetrapolyphosphate as did Ebel's solvent. In addition R sub F values were higher and more conveniently distributed. The new solvent has proved to be superior to Ebel's solvent since more species determined, hydrolysis is significantly reduced, and separations can be carried out on thinner paper and at room temperature. (Little-Battelle) W74-01366

STATE OF RARE EARTH ELEMENTS IN SUR-WATERS (O SOSTOYANII ELEMENTOV V REDKOZEMEL'NYKH

POVERKHNOSTNYKH VODAKH), Akademiya Nauk SSSR, Moscow. Institut Geokhimii i Analiticheskoi Khimii. For primary bibliographic entry see Field 02K. W74-01395

COPPER MICRONUTRIENT REQUIREMENT

FOR ALGAE, Missouri Univ., Columbia. Dept. of Chemistry. For primary bibliographic entry see Field 05C.

FLUOROMETRIC DETERMINATION OF SELENIUM IN WATER WITH 2,3-DIAMINONAPHTHALENE, New York State Dept. of Health, Albany. Div. of

Lab., and Research.

Environmental Science and Technology, Vol 7, No 9, p 823-824, September 1973. 2 tab. 7 ref.

Descriptors: *Water analysis, *Fluorometry, Potable water, Streams. Identifiers: *Selenium, Sample preparation.

A simple procedure is described for determining all forms of inorganic selenium in clean water such as potable water and freshwater receiving waste effluents containing small amounts of organic

Recovery, Precision, Chemical interference.

matter. The method involves hydrogen peroxide oxidation to destroy organic matter and convert inorganic selenium to selenate, addition of HC1 to reduce selenate to selenite and addition of 2,3diaminonaphthalene (DAN) to form piazselenol which is extracted into cyclohexane and measured fluorometrically. Nitrate interference is removed by oxidation to nitrate and metal interferences are masked by complexation. Samples of potable water and water receiving waste effluent were spiked with selenium and analyzed with average recoveries of 101.9 and 101.7 percent. Calibration curves were linear in the range of 0.2-1.0 micrograms Se. Standard deviation of results was 6.3 ercent. (Little-Battelle) W74-01399

QUANTITATIVE ANALYSIS OF AQUEOUS NITRITE/NITRATE SOLUTIONS BY INFRARED INTERNAL REFLECTANCE SPEC-TROMETRY, New York Univ., N.Y. Dept. of Chemistry.

For primary bibliographic entry see Field 02K. W74-01402

COLLABORATIVE STUDY OF A COLORIMET-RIC METHOD FOR DETERMINING ARSENIC RESIDUES IN RED MEAT AND POULTRY. Animal and Plant Health Inspection Service, Belt-

W. H. Buttrill.

Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1144-1148, September 1973. 1 fig, 2 tab, 4 ref.

Descriptors: *Colorimetry, *Chemical analysis, *Poultry, *Pollutant identification, *Hogs, Heavy metals, Methodology, Spectrophotometry, Pollu-tants, Chemical reactions, Color reactions.

Identifiers: *Arsenic, Animal tissues, Meat, Liver, Collaborative studies, Chemical recovery, Preci-

A colorimetric method is described for the determination of arsenic residues, which uses the molybdenum blue complex for a spectrophotometric readout. The method was studied by 9 collaborators, each analyzing 6 groups of 4 samples. Average recoveries for 0.28-2.41 ppm arsenic were 87.6-109.3 percent; standard deviations ranged from 0.037 to 0.225. The method has been adopted as official first action. (Holoman-Battelle) 74-01403

GAS-LIQUID CHROMATOGRAPHIC DETER-MINATION OF CHLORPYRIPHOS IN DUR-SBAN INSECTICIDE FORMULATIONS,

Texas A and M Univ., College Station. Dept. of Agricultural Analytical Services.

A. R. Hanks, B. S. Engdahl, and B. M. Colvin. Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1093-1095, September 1973. 1 fig, 1 tab, 15 ref.

Descriptors: *Separation techniques, *Insecti-

Identifiers: *Gas liquid chromatography, *Chlorpyriphos, *Dursban, Precision, Sample prepara-

Chlorpyriphos can be determined in Dursban (trademark) by gas-liquid chromatography using flame ionization detection and a column packed with OV-17/QF-1 on Gas-Chrom Q. Chlorpyriphos is extracted with chloroform and dieldrin added as an internal standard. The sample is injected into a gas chromatograph and peak height measurements used for quantitative measurement. (Little-Bat-W74-01405

Group 5A—Identification of Pollutants

SIMPLIFIED SPECTROPHOTOMETRIC ANAL-YSIS OF PLANTS FOR SELENIUM, South Dakota State Univ., Brookings. Dept. of

Biochemistry. For primary bibliographic entry see Field 02K.

DISTRIBUTION OF ALKYL ARSENICALS IN MODEL ECOSYSTEM,
Agricultural Research Service, Beltsville, Md.

Agricultural Environmental Quality Inst. primary bibliographic entry see Field 05C. W74-01409

RAPID GAS CHROMATOGRAPHIC METHOD DETERMINATION OF RESIDUAL METHANOL IN SEWAGE,

Department of the Environment, Burlington (Ontario). Centre for Inland Waters.

Environmental Science and Technology, Vol 7, No 9, p 838-840, September 1973. 2 fig, 3 tab, 8 ref.

Descriptors: Methodology, *Chemical analysis, *Pollutant identification, *Sewage effluents, *Gas chromatography, Sewage, Organic compounds. Identifiers: Flame ionization gas chromatography, Residual methanol, *Methanol, Sample preservation, Sample preparation, Accuracy, Precision, Repeatability, Reproducibility.

Described in a rapid and specific flame ionization gas chromatographic method for the determination of low concentrations of methanol over the range 0.5-100 ppm in sewage or other aqueous solutions. The method involves the use of direct aqueous injection gas chromatography on a porous polymer column. No preconcentration or extraction is required. Acidification of the sample at the time of collection to about pH 2 with HCl was found to inhibit completely further loss of residual methanol. Detector response to methanol was linear over a chosen range of 0.5-100 ppm. Feedstock solutions of about 25,000 ppm were found to be best analyzed by dilution to about 25 ppm. The precision (1.2 standard deviation, 2.4 percent coeffi-cient of variation using peak heights) of the method was determined from replicate analyses (10) of a sewage effluent sample containing 50 ppm methanol. The analysis time of approximately 1 min/sample makes the procedure especially suited to process control applications. (Homoman-Battelle) W74-01410

METABOLISM AND BILIARY EXCRETION OF TROUT (SALMO GAIRDNERI),
Oregon State Univ., Corvallis. Dept. of Fisheries

and Wildlife.

For primary bibliographic entry see Field 05C.

UPTAKE OF METHYL MERCURIC CHLORIDE AND MERCURIC CHLORIDE BY TROUT: A STUDY OF UPTAKE PATHWAYS INTO THE WHOLE ANIMAL AND UPTAKE BY ERYTHROCYTES IN VITRO, Michigan State Univ., East Lansing. Dept. of

Physiology. For primary bibliographic entry see Field 05C. W74-01412

CRITERIA FOR MYCOTOXIN STANDARDS. Food and Drug Administration, Washington, D.C. Div. of Chemistry and Physics.

J. V. Rodricks. Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1290-1291, September 1973. 5 ref.

Descriptors: Standards, Analytical techniques.

Identifiers: *Analytical standards, *Aflatoxin M1, *Mycotoxin standards. *Purity, Identifiers:

Since the quality of analytical standards affects results of analyses, it is recommended that mycotoxin standards meet prescribed criteria of purity and that methods be available for analysts to check the concentration and purity of these standards. Criteria should include source of the compound and method of isolation, method of purification and criteria of purity and stability. A procedure for the determination of the concentration and purity of aflatoxin M1 standards which was used in a collaborative study by the International Union of Pure and Applied Chemistry is recommended. (Little-Battelle) W74-01414

MODIFIED DELVES CUP ATOMIC ABSORP-TION DETERMINATION OF LEAD IN BLOOD, Center for Disease Control, Atlanta, Ga.

W. F. Barthel, A. L. Smrek, G. P. Angel, J. A Liddle, and P. J. Landrigan.

Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1252-1256, September 1973. 5 tab, 13 ref.

Descriptors: *Lead, *Chemical analysis, *Pollutant identification, Heavy metals, Methodology, Pollutants, Sheep, Goats, Cattle.

Identifiers: Delves cup method, *Atomic absorption spectrophotometry, *Blood, *Animal tissues, Serum, Blood plasma, Bovine serum, Humans.

A modification of the Delves atomic absorption micro method for blood lead determinations is presented. The principal differences between the present modification and the original Delves method are the improvement in hardware to overcome problems is reproducibility and a char method to essentially eliminate the smoke peak which normally causes serious interference. The method has been applied to several different types of blood samples with excellent results. (Holoman-W74-01415

HERBICIDE ANALYSIS: RELATIONSHIP BETWEEN MOLECULAR STRUCTURE AND RETENTION INDEX,

Department of the Environment, Burlington (Ontario). Inland Waters Branch.

R. H. Larose, and A. S. Y. Chau Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1183-1187, September 1973. 6 tab, 8 ref.

Descriptors: *Chlorinated hydrocarbon pesticides. 24-D, 245-T, Molecular structure.

Identifiers: *Retention time, *Gas liquid chromatography, *Esters, Silvex, 24-DB, 246-T, Re-

tention index, Sample preparation.

Five chlorophenoxy acids, 2,4-D, 2,4,5-T, silvex, 2,4-DB, and 2,4,6-T, were esterified with methanol, ethanol, n-propanol, isopropanol, n-buisobutanol. tert-butanol. chloroethanol to investigate the retention times of the esters on three different GLC columns. A linear relationship was found between the logarithm of the retention time of a series of esters a particular chlorophenoxy acid and the number of carbon atoms in the alcohol used for esterification, provided the alcohols were part of a ogous series. This relationship can be used to predict the retention time of an ester without having to synthesize it. It is also possible to predict which alcohol will yield esters with retention times different from those of co-extractive peaks and which will yield esters which can best be separated by the particular chromatographic system. total retention index is divided into three additive components: the alcohol, the acid, and the interaction contributions. (Little-Battelle)
W74-01416 DETERMINATION OF CHLORINATED PESTI-CIDES IN WHOLE BLOOD.

Iowa State Univ., Ames. Veterinary Diagnostic

P. E. Stretz, and H. M. Stahr. Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1173-1177, September 1973. 4 tab, 6 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Dieldrin, Methodology, *Pollutant identification, Insecticides, *DDT, Chemical analysis, Statistical methods, *Gas chromatography.

Identifiers: *Blood, Electron capture gas chromatography, Quantitative analysis, p p' DDT, *Lindane, Biological samples, Sample preparation, Data interpretation, Collaborative studies, Body fluids, Gas liquid chromatography.

Eight whole blood samples spiked with lindane, dieldrin, and p,p'-DDT at levels of 2.5, 12.6, 126, and 630 ppb each were sent to 11 collaborators for analysis. The method evaluated uses sulfuric acid to liberate the pesticides from the blood matrix. The pesticides are then extracted with 10 percent acetone in hexane. Pesticides were identified and quantitatively analyzed by gas-liquid chromatography using an electron capture detector. Mean values at all levels are in good agreement with the spiking levels. However, statistical analysis of the data reveals a large systematic error. Further evaluation of the sulfuric acid method by comparison with other methods is recommended. (Holoman-Battelie) W74-01417

DETERMINATION OF MELEIC HYDRAZIDE RESIDUES IN TOBACCO AND VEGETABLES,

Department of Agriculture, Ottawa (Ontario). Chemistry and Biology Research Inst. M. Inhat, R. J. Westerby, and I. Hoffman.

Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1164-1172, September 1973. 7 fig, 4 tab, 19 ref.

Descriptors: *Plant growth regulators, *Pollutant identification, Methodology, *Chemical analysis, Plant tissues, *Tobacco, *Vegetable crops, Distallation, Spectrophotometry, Plant growth, Agronomic crops, Water pollution Potatoes, Carrots.

Identifiers: *Maleic hydrazide, Chemical recovery, Precision, Sensitivity, Detection limits, 1 2-Dihydropyridazone-3 6-dione.

The distillation-spectrophotometric method of Hoffman for determining maleic hydrazide has been modified to include a double distillation and was applied to the determination of 1-30 ppm hydrazide residues in tobacco and vegetables. Recoveries of 1-23 micrograms added maleic hydrazide were independent of weight of maleic hydrazide were independent of weight of maleic hydrazide, but did depend on sample and sample weight. The following recoveries were obtained from 0.5 g sample: pipe tobacco, 84 percent; com-mercially dehydrated potato, 83 percent; cigar tobacco, 81 percent; dried potato, 76 percent; fluecured tobacco, 73 percent; dried carrot, 71 percent. In the absence of sample, the recovery was 82 percent. When appropriate standard curves were used, maleic hydrazide levels determined in tobacco samples were essentially independent of sample weight in the range 0.1-3 g. The means relative standard deviation for a variety of fieldtreated and fortified tobacco samples containing 1-28 ppm maleic hydrazide was 3 percent. The precision and sensitivity of this procedure seem to be substantial improvements over official method 29.111-29.117. It is recommended that the present method be subjected to a collaborative study. (Holoman-Battelle) W74-01418

ELECTRODE MICRORESPIROMETER. Newcastle-upon-Type Univ. (England). Dept. of

Identification of Pollutants—Group 5A

H. J. Atkinson, and L. Smith. Journal of Experimental Biology, Vol 59, No 1, p 247-253, August 1973. 2 fig, 15 ref.

Descriptors: *Nematodes, *Oxygen requirements, Laboratory equipment, Calibrations, Respiration, Oxygen demand, Bioassay, Cultures.

Identifiers: Enoplus brevis, *Respirometers, Detection limits, *Membrane electrodes, Macroin-

Ocygen consumption of individual small organisms (60-380 micrograms body weight) such as nematodes can be measured using a Clark-type ox-ygen electrode. The apparatus consists of the electrode within a stainless steel housing which is surrounded by a constant-temperature water jacket. The membrane of the electrode forms part of an enclosed chamber which holds the animal to be tested. The chamber can be sealed and a magnetic stirrer reduces the diffusion gradient between the animal and the electrode. The procedure for calibrating the respirometer is described. In tests with marine mematodes, Enoplus brevis, oxygen consumption ranges from 0.135 to 0.036 cu mm/hr. The procedure is accurate and reliable for measurements of 0.02-0.2 cu mm/hr. (Little-Battelle) W74-01419

AN IMPROVED METHOD OF CELL ENU-MERATION FOR FILAMENTOUS ALGAE AND BACTERIA,

Medical Coll. of Ohio, Toledo. Dept. of Microbiology. J. C. Burnham, T. Stetak, and J. Boulger.

Journal of Phycology, Vol 9, No 3, p 346-349, September 1973. 2 fig, 10 ref.

*Algae, Bacco. Microscopy, Descriptors: Population. Statistical methods, Cultures,

Cyanophyta.
Identifiers: *Cell counts, *Filamentous algae. *Filamentous bacteria, Phormidium luridum, Ac-

Cells of filamentous algae and bacteria can be simply counted by applying a drop from the shaken culture to a 400 square grid of a Petroff-Hausser Bacterial Counting Chamber, applying a coverslip, and counting cells in 10 selected squares under a microscope (number of cells is termed C). In addition, the grid is organized into 25 blocks of 16 squares per block, and 15 of these blocks are examined. The total number of squares containing any part of a filament is termed B. The mean number of cells per chamber square can then be calculated as CB/2400. The total count can be determined using the conversion from cells per square to cells per milliliter. Statistical analysis of results with Phormidium luridum var. olivacea and comparsion with other methods showed that the method is useful for routine cell enumerations. (Little-Battelle) W74-01421

THE EFFECTS OF BACTERIA ON THE GROWTH AND REPRODUCTION OF GROWTH AND REPROI OEDOGONIUM CARDIACUM, California Univ., Berkeley. Dept. of Botany. For primary bibliographic entry see Field 05C. W74-01422

OBSERVATIONS ON THE ECOLOGY OF LAMINARIA SINCLAIRII ON THREE NORTHERN OREGON BEACHES, Arch Cape Marine Labs., Oreg. For primary bibliographic entry see Field 05C. W74-01423

MODIFICATIONS IN FILTRATION METHODS FOR THE MEASUREMENT OF INORGANIC C--14 UPTAKE BY PHOTOSYNTHESIZING AL-

Kinnerat Limnology Lab., Tiberias (Israel).

Journal of Phycology, Vol 9, No 3, p 327-330, September 1973. 1 fig. 4 tab. 16 ref.

Descriptors: *Filtration, *Carbon, Absorption, *Photosynthesis, *Primary productivity, *Phytoplankton, Separation techniques, Radioactivity techniques, Cultures. Identifiers: Errors, Sample preparation, *Lau-

deria, *Gonyaulax polyedra.

In the course of routine primary productivity ex-periments with phytoplankton, the filtration step may introduce errors into the determination of inorganic C-14 uptake into particulate and filtrate organic fractions. However, when ultrafine glass fiber filters, low filtration pressures, and fuming over HC1 were used, and corrections made for nonbiological adsorption of radioactivity on filters, no significant changes of cpm retained on fil-ters per milliliter of filtration volume were found in tests with various algal populations. Cultures of Lauderia sp. and Gonyaulax polyedra, when photosynthesizing in 1 compartment of a 2-chambered diffusion apparatus, released similar amounts of radioactive dissolved organic compounds measured after diffusion or upon filtration. Under our conditions, only negligible amounts of dissolved organic compounds were retained by filters. For many natural waters, therefore, these filtration techniques permit adequate accuracy for primary productivity measurements. (Little-Bat-W74-01425

ELECTROPHORETIC AND IMMUNOLOGICAL ANALYSES OF CINACEAN ALGAE, SEVEN CHLOROSAR-

Louisiana State Univ., New Orleans. Dept. of Biological Sciences.

D. L. Thomas, and R. D. Groover. Journal of Phycology, Vol 9, No 3, p 289-296, September 1973. 10 fig, 1 tab, 34 ref.

Descriptors: *Chlorophyta, *Biological properties, *Chemical analysis, Enzymes, Aquatic algae, Systematics, Biochemistry, Proteins, Pollutant identification, Electrophoresis.

Identifiers: *Chemotaxonomy, *Biochemical

characteristics, Starch gel electrophoresis, Disc gel electrophoresis, Serology, Immunology, Cul-turing techniques, Malate dehydrogenase, Glutadehydrogenase, Leucine aminopeptidase, idase, Chemical concentration, Alpha Peroxidase, Chemical conce esterases, Benzidine, Pyrogallol.

Proteins from 7 species of chlorosarcinacean algae representing 4 genera were studies with starch and disc gel electrophoresis and immunology to determine biochemical relationships. Migration patterns of enzymes and serological reactions indicated that 4 species of Chlorosarcinopsis were closely related, whereas Friedmannia israeliensis, Fasciculochloris boldii, and Chlorosarcina longispinosa were more diverse. Malate dehydrogenase, glutamate dehydrogenase, nonspecific alpha esterases, and peroxidase (using pyrogallol as the hydrogen donor) were present in all 7 species. No peroxidase activity occurred with benzidine. Leucine aminopeptidase was obvious in only 2 species. A single distinct band of general protein in F. israeliensis and C. longispinosa suggested the presence of homogenous reserve protein. The 7 species exhibited serological affinito 4 isolates of Protosiphon representing diverse morphology within the genus. The data are discussed relative to current knowledge of comparative morphology of chlorosarcinacean algae. (Holoman-Battelle) W74-01426

SOME THOUGHTS ON NUTRIENT LIMITA-TION IN ALGAE, Dunstaffnage Marine Research Lab., Oban (Scot-

For primary bibliographic entry see Field 05C. W74-01428

ALGAL SUCCESSION ON ARTIFICIAL REEFS IN A MARINE LAGOON ENVIRONMENT IN

Guam Univ., Agana. Marine Lab. For primary bibliographic entry see Field 05C.

DIATOM ASSOCIATIONS IN YAQUINA ESTUARY, OREGON : A MULTIVARIATE ANALYSIS.

Oregon State Univ., Corvallis. Dept. of Botany. For primary bibliographic entry see Field 05B. W74-01430

RELIABILITY OF AN AMMONIA PROBE FOR ELECTROMETRIC DETERMINATION TOTAL AMMONIA NITROGEN IN IN FISH

TANKS, Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inti. J. Barica.

Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1389-1392, September 1973. 3 fig, 1 tab, 4 ref.

Descriptors: *Ammonia, Water analysis, *Calibrations, Electrodes, Aquaria.

Identifiers: *Gas-membrane electrodes, *Sample preparation, Detection limits, Precision, monia-nitrogen, Membrane electrodes, Calibration curves.

The Orion ammonia electrode model 95-10, which is a gas sensing probe, was evaluated for determining total ammonia nitrogen in fish tanks. The probe senses ammonia which diffuses through a hydrophobic gas-permeable membrane until the partial pressure is the same on both sides of the membrane. Since the probe senses only ammonia gas, it is necessary to raise the pH of the test solution to 12-13 to convert NH (plus) to the un-ionized form by adding NaOH. At low levels of NH3-N found in aquaria (0.3-2 mg/1) the probe response does not follow the Nernstian equation. Therefore, it is necessary to construct calibration curves using fresh aquarium water for greatest accuracy. The probe response stabilizes after about 5 minutes at low levels (about 1 mg/1) of ammonia. Comparison of probe results with those obtained spectrophotometrically showed that the probe was unsuitable below 0.1 mg/l and gave values differing by plus or minus 17 percent in the range 0.2-0.5 mg/l. (Little-Battelle)
W74-01433

GROWTH RATES OF INTERTIDAL MOL-LUSCS AS INDICATORS OF EFFECTS OF UNEXPECTED INCIDENTS OF POLLUTION, Fisheries Research Board of Canada, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 05C.

BEHAVIORAL RESPONSES TO CHANGES IN HYDROSTATIC PRESSURE AND LIGHT DUR ING LARVAL DEVELOPMENT OF THE LOBSTER HOMARUS GAMMARUS, Marine Biological Station, Port Erin, Isle of Man (England).

For primary bibliographic entry see Field 05C. W74-01436

AN AUTOMATED METHOD FOR THE DERTEMINATION OF TRACE AMOUNTS OF METAL IONS BY ION-EXCHANGE CHRO-MATOGRAPHY. DETERMINATION OF ZINC (II) IN WATERS.

Government Industrial Research Inst., Nagoya (Japan). H. Matsui.

Analytica Chimica Acta, Vol 66, No 1, p 143-146, August 1973. 1 fig, 3 tab, 9 ref.

Group 5A—Identification of Pollutants

Descriptors: "Zinc, "Water analysis, Methodology, "Colorimetry, Chemical analysis, Cations, Heavy metals, Automatic control, Sea water, Muwater, Groundwater, Potable water, nicipal *Trace elements.

Identifiers: Natural waters, *Ion exchange chromatography, Trace levels, Zincon, Chromogenic reagents, 2-Carboxy-2'hydroxy-5'sulfoformazyl-benzene, Precision, Shonai-gawa River, Yadagawa River, Ise Bay, Chemical interference, Ionic interference.

An automated method for the determination of trace amounts of zinc- (II) by ion-exchange chromatography and colorimetry is described; zinc is determined colorimetrically with zincon, 2-carboxy-2'-hydroxy-5'-sulfoformazylbenzene. In the proposed method, 2.0-15.0 micrograms of zinc can be determined without interference and with a maximum error of 3 percent. In applications of this method, the zinc content of several kinds of water was determined. Zinc was adsorbed quantitatively from water containing the same amounts of these ions as seawater, acidified to 4 percent acetic acid. (Holoman-Battelle) W74-01438

THE DETERMINATION OF ORGANO-SULFUR COMPOUNDS BY THIN-LAYER CHRO-MATOGRAPHY VIA A LIGAND-EXCHANGE PRECESS.

Dalhousie Univ., Halifax (Nova Scotia). Trace Analysis Research Center.

R. W. Frei, B. L. MacLellan, and J. D. MacNeil. Analytica Chimica Acta, Vol 66, No 1, p 139-142, August 1973. 2 tab, 5 ref.

Descriptors: *Chemical analysis, *Separation techniques, *Pollutant identification, *Sulfur com-

pounds, Organic compounds, Fluorescence. Identifiers: *Organosulfur compounds, *Ligand exchange method, Quantitative analysis, Palladium chloride-calcein reagent, Thin layer chromatography, Detection limits, Accuracy, Precision, Chromogenic reagents, Reproducibility, Method evaluation, Palladium, Calcein, 2-Benzimidazolethiol, 5-Benzol-2-thiohydantoin, 2-Mercaptobenzoic acid, Thioacetamide, 2-Mercaptobenzothiazole, Mercaptosuccinic acid, 2-Thiobarbituric acid, Thiocarbanilide, Thioglycollic acid, Thiourea.

The palladium chloride-calcein spray reagent may be used for the detection of many sulfur-containing compounds after separation on thin-layer chromatograms. Palladium forms stable complexes with sulfur in certain oxidation states, thus releasing the calcein with which it had been complexed. The sulfur-containing compounds investigated were detected by the fluorescence of the free calcein. Maximum fluorescence intensity was observed 15-60 min after spraying with a gradual loss in intensity over 15 h. The quantitative application of the method was investigated for thioacetamide and the results showed that thioacetamide could be determined semiquantitatively at the visual detection limit (10 ng/spot) with acceptable precision and accuracy. All results obtained indicate that the method has excellent possibilities for development as a routine technique. (Holoman-Battelle)

STUDY OF CHELATED MIXTURES OF FER-RIC IONS WITH NITRILOTRIACETIC, SULFO--5-SALICYLIC AND PYROCATECHOL-3.5-DIS-ULFONIC ACIDS, (IN FRENCH),

M.Morin, and J. P. Scharff. Analytica Chimica Acta, Vol 66, No 1, p 113-121, August 1973. 3 fig, 2 tab, 28 ref.

Descriptors: *Iron, *Nitrilotriacetic acid, *Pollutant identification, Chelation, Cations, Heavy metals, *Organic acids, Methodology, *Sulfur compounds.

Identifiers: Sulfo-5-salicylic acid, Pyrocatechol-3 5-disulfonic acid, Mixtures, *Metal chelates, Potentiometry, Tristimulus colorimetry, Stability constants, Chelating agents.

A detailed examination of mixed chelate formation in systems containing iron (III), nitrilotriacetic acid, and 5-sulfosalicylic acid or pyrocatechol-3,5 disulfonic acid, has been made. Precise stability constants for the iron (III)-nitrilotriacetic acid system were established. Potentiometric methods and tristimulus colorimetry were used to establish mixed chelate formation. The compositions and stability constants of all the species formed are given. (Holoman-Battelle) W74-01440

THE DETERMINATION OF CADMIUM BY ATOMIC ABSORPTION IN AIR, WATER, SEA WATER AND URINE WITH A R.F. CARBON BED ATOMIZER.

Louisiana State Univ., Baton Rouge. Dept. of Chemistry.

J. W. Robinson, D. K. Wolcott, P. J. Slevin, and G. D. Hindman. Analytica Chimica Acta, Vol 66, No 1, p 13-21,

August 1973. 7 fig, 2 tab, 11 ref.

Descriptors: *Cadmium. Air, *Water analysis, Methodology, *Chemical analysis, *Pollutant identification, Heavy metals, Sea water, Freshwater, Urine, Aqueous solutions, Water pollution, Air pollution.

*Atomic Identifiers: absorption trophotometry, Biological samples, Detection limits, Absorbance, Perchlorates, Borates, Ionic interference. Chemical interference. Carbon bed atomizers, Sensitivity.

The analytical parameters are described for the determination of cadmium by atomic absorption in air, water, seawater, and urine. The technique involves the use of an R. F. generator which heats up a carbon bed to approximately 1400 degrees. The sample is reduced to free metal atoms and is analyzed directly afterwards. The atomization step and the measuring step are separate steps in this procedure. Detection limits of 0.1 pg were reached. Quantitative analyses were carried out on the types of samples indicated. Chemical interferences were studied with a 100-fold excess of the interfering ion. No interference was noted; a slight depression of the absorption signal was noted in the presence of perchlorate, and a more severe (30 percent) depression of signal was noted when borate was present. Absorption traces were compared for Cd in drops injected directly onto the carbon bed and for Cd solution introduced using carbon slivers. The Cd concentrations were the same in both cases; the results showed the direct drop technique to be more sensitive than the car-bon sliver technique. (Holoman-Battelle) W74-01441

THE POTENTIOMETRIC TITRATION OF POTASSIUM IN SEA WATER WITH A VALINOMYCIN ELECTRODE,

Goteborg Univ. (Sweden). Dept. of Analytical T. Anfalt, and D. Jagner. Analytica Chimica Acta, Vol 66, No 1, p 152-155,

August 1973. 1 tab, 13 ref.

Descriptors: *Potassium, *Sea water, *Water analysis, *Volumetric analysis, Alkali metals, Pollutant identification, Salinity, Methodology, Cations, *Electrodes.

Identifiers: *Potentiometric titration, Valinomycin electrode, Precision, Ion selective electrodes.

The valinomycin electrode was investigated to determine if it could be used for highly precise determinations of potassium. Using Standard Sea Water, the potassium concentration was determined, from 97 titrations in which freshly

prepared electrodes were used for approximately every tenth titration, to be 10.22 plus or minus 0.03 mmole/100 g of seawater. The relative standard deviation for a single titration is not, however, better than 0.026. (Holoman-Battelle)

COMPUTER IDENTIFICATION OF BACTERIA ON THE BASIS OF THEIR ANTIBIOTIC SUSCEPTIBILITY PATTERNS,

National Institutes of Health, Bethesda, Md. Clini-

National Institutes of Ficanti, Beneficial, and Cal Pathology Dept.
R. Friedman, and J. MacLowry.
Applied Microbiology, Vol 26, No 3, p 314-317,
September 1973. 3 tab, 10 ref.

Descriptors: *Computer programs, *Pollutant identification, *Pathogenic bacteria, *Enteric bacteria, *Antibiotics (Pesticides), *Mathematical models, Pseudomonas, Salmonella, Streptococcus, E. coli.

Identifiers: Sensitivity, Accuracy, Selective media, Staphylococcus, Klebsiella, Proteus, Ser-ratia, Enterobacter, Citrobacter, Bacteroides, Haemophilus, Herellea, Bacillus, Providence.

A computer program utilizing a Baysean mathematical model was developed to identify bacteria solely on the basis of their antibiotic sensitivities. The model contains probability data on the antibiotic sensitivity patterns of 31 species of bacteria of the following genera: Staphylococcus, Pseudomonas, Klebsiella, Escherichia, Proteus, Streptococcus, Enterobacter, Serratia, Citrobacter, Bacteroides, Haemophilus, Bacillus, Salmonella, and Providence. During a 4-month test period, antibiotic sensitivity data on 1,000 clinical isolates were processed by the program. The identification achieved by using the model was the same as that of the laboratory for over 86 percent of the isolates. (Little-Battelle) W74-01443

SAND BEACH BACTERIA: ENUMERATION AND CHARACTERIZATION.

American Univ., Beirut (Lebanon). Dept. of Biolo-

H. M. Khiyama, and J. C. Makemson. Applied Microbiology, Vol 26, No 3, p 293-297, September 1973. 1 fig, 5 tab, 17 ref.

Descriptors: *Connate water, *Sands, *Separation techniques, *Cultures, Seashores, Temperature, Hydrogen ion concentration, Biochemistry, Fermentation, Enzymes, Microscopy, Beaches, Marine bacteria.

Identifiers: Characterization, Culture media, Sam-ple preparation, Motility, Voges-Proskauer reac-tion, *Lebanon (Sinbad Beach), Biochemical tests, Enumeration.

Sand and interstitial water from Sindbad Beach, 30 km south of Beirut, Lebanon, were collected for enumeration of bacteria and for determination of biochemical, morphological, and cultural characteristics of several hundred individual strains. Total counts were determined by placing small samples in screw-cap tubes, adding peptone, shaking, plating a sample from the tube on peptone-yeast extract medium. Interstitial bacteria were collected with interstitial water samples suctioned through an HA-Millipore filter. PYE broth was then added to the absorbant pad below the membrane. Bacteria from sand and water were counted using the microscope after suctioning through Mil-lipore filters and fixing and staining with erythrosin in aqueous phenol. Additional tests included sugar fermentation, hydrolysis of gelatin and starch, Voges - Proskauer reaction, indole production, motility, catalase, oxidase, flagellar stain, ability to grow aerobically on single carbon sources, and ability to grow at various tempera-tures and pH values. The number of interstitial bacteria was estimated to be a significant fraction of the total number of bacteria present. Three hun-

Identification of Pollutants—Group 5A

dred sixty-two strains were isolated and submitted to the cultural and biochemical tests. Fermentational abilities and the production of indole suggested that a significant number of these bacteria were symbiotically associated with resident metazoans. (Little-Battelle) W74-01444

SMALL-VOLUME SOLID-ELECTRODE FLOW-SMALL-VOLUME SOLID-ELECTRODE FLOW-"THROUGH ELECTROCHEMICAL CELLS.

PRELIMINARY EVALUATION USING PULSE POLAROGRAPHIC TECHNIQUES, Hoffman-La Roche, Inc., Nutley, N.J. Animal Health Research.

For primary bibliographic entry see Field 07B.

SOLUBLE ALUMINUM IN MARINE AND FRESH WATER BY GAS-LIQUID CHRO-MATOGRAPHY,

Alaska Univ., College. Inst. of Marine Science.
M-L. Lee, and D. C. Burrell.

Analytica Chimica Acta, Vol 66, No 2, p 245-250, September 1973. 5 fig, 17 ref.

Descriptors: *Sea water, *Aluminum, *Freshwater, *Pollutant identification, Chemical analysis, Water analysis, Heavy metals, Separation techniques, Solvent extractions.

Identifiers: Natural waters, *Gas liquid chro-

Metal matography, chelates. Trifluoroacetylacetone, Partition chromatography, Electron capture gas chromatography, Aluminum trifluoroacetylacetonate, Sample prepara-

The feasibility of determining the extractable aluminum contents of natural waters, with particular emphasis on seawater, by gas-liquid partition chromatography has been demonstrated. The metal is chelated with trifluoroacetylacetone, extracted into toluene and injected into the chromatograph using direct on-column injection. Under optimized instrumental conditions, better than picogram quantities of aluminum as the trifluoroacetylacetone complex may be detected. (Holoman-Battelle) W74-01446

ATOMIC ABSORPTION METHOD FOR DETERMINING MICROMOLAR QUANTITIES OF ALIPHATIC SECONDARY AMINES, Massachusetts Univ., Amherst. Dept. of Chemis-

P. J. Oles, and S. Siggia.

Analytical Chemistry, Vol 45, No 12, p 2150-2151, October 1973. 2 tab, 7 ref.

Descriptors: Chemical analysis, *Pollutant identification, *Aqueous solutions, Methodology, Chemical reactions, Chemical precipitation, Nitrogen compounds, Organic compounds. Identifiers: *Amines, *Atomic absorption spec

trophotometry, *Organonitrogen compounds, *Aromatic amines, Dialkyldithiocarbamic acids, Detection limits, Chemical recovery, Diethylamine, N-methylaniline, N-Ethyl-n-butylamine, Nickel dialkyldithiocarbamate, Di-n-butylamine, Di-n-hexylamine, Di-n-octylamine, N-Butyl-n-dodecylamine, Di-n-dodecylamine, Dicyclohexylamine, Piperidine.

The formation of a Cu or Ni dialkyldithiocarbamate (Cu (DTC)2 or Ni (DTC)2) precipitate from the reaction between either metal and dialkyldithiocarbamic acids (DTCH) in aqueous solution serves as the basis for the qualitative identification of secondary amines. In this study the Ni (DTC)2 formed in the reaction is separated from the reaction medium by filtering and is digested in a mix-ture of 1:1 HNO3:HCl. The resultant solution is then analyzed for nickel content by means of conventional atomic absorption spectrophotometry. A single calibration curve is required and, in this work, nickel di-n-butyldithiocarbamate (Ni (n-But2DTC)2) was used to prepare all calibration curves. Nine secondary amines and one aromatic amine (N-methylaniline) were studied by this procedure. Xanthate formation occurred in the secondary amine samples containing alcohol, but there was no interference observed. If the filter containing the precipitate is treated with the acid mixture, high recoveries result. The practical detection limit for the method is approximately 0.30 micromole of secondary amine per ml of solution with a reaction time of 1.5-2 hr, a medium fritted glass funnel for filtration and a temperature of 20C. N-methylaniline failed to react quantitatively under a wide range of conditions. Various temperatures, amounts of reagents, and reaction times were studied with recoveries of 60 to 90 percent, and the reproducibility obtained under identical experimental conditions was only fair. (Holoman-Battelle) W74-01492

ANALYTICAL METHODOLOGY FOR BIOAC-TIVE COMPOUNDS. PHOTOCHEMICALLY
ASSISTED ANALYSIS OF CHLORINATED
HYDROCARBON PESTICIDES IN THE
PRESENCE OF POLYCHLORINATED BIPHEN-

Michigan State Univ., East Lansing. Pesticide Research Center.

R. A. Leavitt, G. C. C. Su, and M. J. Zabik. Analytical Chemistry, Vol 45, No 12, p 2130-2131, October 1973. 2 fig, 1 tab, 12 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Polychlorinated biphenyls, Methodology, *Pollutant identification, Pesticide residues, Chemical analysis, *Gas chromatography, DDE, Dieldrin, DDT, Insecticides.

Identifiers: *Electron capture gas chromatography, Quantitative analysis, *Photodegradation, Isomers, Degradation products, Precision, Photolysis, Chemical interference, Accuracy, Detection limits, Aroclor 1254, Reproducibility, Photodecomposition, Dichlorobenzophenone, 2 2-bis- (p-Chlorophenyl)-1-chloroethylene, Gas liquid chromatography, 2-(p-Chlorophenyl)-2-chloroethylene. (dichlorophenyl)-1-

Three chlorinated pesticides, dieldrin, DDT, and DDE were chosen to test the applicability of removing PCB's and the chlorinated pesticides in the presence of each other. Under the gas-liquid chromatographic conditions used in the study, certain PCB peaks interfered with each pesticide peak. In addition, the GLC peaks for DDE and dieldrin had similar retention times. To determine the optimum period of irradiation at 280-320 nm (Irradiation at 253.7 nm was quite destructive to the pesticides and caused large trailing solvent peaks probably due to chlorination of the solvent.), two concentrations (1 and 10 ppm) of Aroclor 1254 were photolyzed and the total GLC peak area was measured as a function of time. In addition to the reduction in total PCB peak area, there was, a general shift to peaks of shorter retention times as the PCB's were stepwise photochemically degraded to the less chlorinated isomers. Under the photolytic conditions used, the chlorinated pesticides also underwent varying degrees of degradation. Use of photochemical degradation to remove PCB's from samples also containing chlorinated hydrocarbon pesticide residues can be a very effective method even when the PCB concentration is much larger than the individual pesticide concentrations. Total analysis time is less than one hour per sample with photolysis carried out over night. The lower limits of practical quantitation are equivalent to 0.5 ppm for PCB's and equivalent to 0.05 ppm for the individual chlorinated pesticides. Reproducibility tests showed this method to be very precise. W74-01493

DISTRIBUTION STUDIES OF RADIUM AND OTHER METALLIC ELEMENTS BETWEEN THENOYLTRIFLUOROACETONE IN METHYL ISOBUTYL KETONE AND AQUEOUS SOLU-

TIONS, Oak Ridge Associated Universities, Inc., Tenn. Special Training Div.

. M. Jackson, and G. I. Gleason. Analytical Chemistry, Vol 45, No 12, p 2125-2129, October 1973, 7 tab. 7 ref.

Descriptors: *Aqueous solutions, Separation techniques, Heavy metals, Solvent extractions, Alkaline earth metals, *Alkali metals, *Radioactivity techniques, Separation techniques, Tracers, Methodology, Radioisotopes, Iron, Molybdenum, Gold, Magnesium, Manganese, Cobalt, Nickel, Copper, Lead, Radium radiosiotopes, Hydrogen concentration, Zinc, Cadmium, Calcium, Strontium.

Identifiers: Distribution coefficients, *Thenoyl-trifluoroacetone, *Ketones, *Radium, Rare earth elements, Organic solvents, Ra-224, Liquid scintillation, Atomic absorption spectrophotometry, Thorium, Praseodymium, Barium, Technetium, Tungsten, Indium, Yttrium, Lanthanum, Thalli-um, Co-60, Fe-59, Mn-54, Ni-63, Cu-64, As-76, Au-198, Mo-99, Pr-142, W-187, Pb-212, Th-228.

Using a standardized procedure previously reported, the distribution of radium and 13 other metallic elements were quantitatively compared. by distributing a radiotracter of the element of interest between an aqueous phase and an organic phase consisting of 0.1 M TTA in MIBK. From the ratio of activity in the organic phase to activity in the aqueous phase, distribution coefficients were calculated as a function of pH (Atomic absorption was used for measuring the concentration of magnesium). Using radium-224, the extraction of radium by TTA in MIBK was successfully demonstrated to occur under almost identical pH conditions as previously reported for barium. In addition, distribution coefficients for reversible extractions into the TTA-MIBK phase from the aqueous phase were measured for magnesium, manganese, cobalt, nickel, copper, praseodymium, lead, and thorium. When the log D values were plotted vs. pH for iron, molybdenum, technetium, tungsten, and gold, the normal Sshaped curves were not obtained. From the data, pH conditions can be selected to allow the separation of the daughter elements, radium and lead, from thorium, as well as for many other element pairs. (Holoman-Battelle) W74-01494

CHROMATOGRAPHY GAS-SOLID MACRORETICULAR CATION EXCHANGE RESINS

Seton Hall Univ., South Orange, N.J. Dept. of

R. F. Hirsch, H. C. Stober, M. Kowblansky, F. N. Hubner, and A. W. O'Connell. Analytical Chemistry, Vol 45, No 12, p 2100-2105, October 1973. 2 fig, 7 tab, 22 ref.

Descriptors: *Cation exchange, *Pollutant identification, Alkali metals, Alkaline earth metals, Selectivity, Heavy metals, Separation techniques, Methodology, Organic compounds, Aromatic compounds, Cations, Hydrogen, Sodi um, Potassium, Cesium, Magnesium, Calcium, Strontium, Zinc, Chromium.

Identifiers: *Macroreticular cation exchange resins, "Aromatic hydrocarbons, "Gas solid chro-matography, "Aliphatic hydrocarbons, Olefins, Thermal stability, Retention time, n-Alkanes, Amberlyst A-15, Ion exchange resins, Lithium, Rubidium, Barium, Lanthanum, Pentane, Hexane, Heptane, Octane, Cyclohexene, Benzene, Cyclopentane, Cyclohexane, Cycloheptane, Cycloheptane, Cyclocane, Cyclocane, Cycloheptane, 2 2 4-Trimethyl-pentane, Methylcyclopentane, 1-Heptene, 1-Hexene, 1-Octane, 2 3-Dimethyl-2-butene, 3 3-Dimethyl-2-butene, Dimethyl-1-butene.

Group 5A-Identification of Pollutants

Several metal ion forms of the macroreticular cation exchanger Amberlyst 15 were prepared and tested for use as gas-solid chromatographic (GSC) packings for the separation of a wide variety of hydrocarbons including normal alkanes and aromatic hydrocarbons. A drop of the test compound was evaporated inside a stoppered flask to which a small amount of methane had been added. Samples were withdrawn and injected into the chromatograph with methane being used as a marker for the calculation of retention times. Macroreticular cation exchange resins were found to be adsorptive packings for gas-solid chromatography, and to show good selectivity among hydrocarbons. Short columns were satisfactory even at temperatures well above the boiling points of the compounds being separated. Retention indices correlated with the size and electronic structure of the resins cation. In the alkali metal and alkaline earth series, retention indices of aromatic compounds increase with cation size. The silver form of the resin retains aromatic and olefinic compounds strongly, and separates geometric isomers of the olefins. Data are also presented on the effect of specific surface area and sample size on retention, and on the thermal stability of the various resin forms. (Holoman-Battelle) W74-01495

ION PAIR PARTITION CHROMATOGRAPHY OF ORGANIC AMMONIUM COMPOUNDS, Uppsala Univ. (Sweden). Dept. of Analytical

Chemistry.

S. Eksborg, and G. Schill. Analytical Chemistry, Vol 45, No 12, p 2092-2100, October 1973. 8 fig, 7 tab, 28 ref.

Descriptors: *Separation techniques, *Pollutant identification, Methodology, Organic compounds, Ammonium compounds, Solvent extractions.

Identifiers: *Ion pair partition chromatography, *Ouaternary alkylammonium ions. *Ouantitative *Organoammonium compounds, Alanalysis. analysis, Organisaminiani compounds, isk kylammonium picrates, Extraction constants, Liquid liquid chromatography, Chemical recovery, Molar absorptivity, Chromatographic peaks, Chemical concentration, 2-Hydroxyethyltrimethylammonium picrate, Organic solvents, Tetrabutylammonium benzoate, Tetrabutylam-monium salicylate, Tetrabutylammonium toluene-4-sulfonate, Tetrabutylammonium dipicrylamate, Tetrabutylammonium chloride.

Liquid-liquid chromatography systems based on ion pair partition have been studied with quaternary alkylammonium ions as samples, chloroform plus 1-pentanol (19 plus 1) as mobile phase and aqueous picrate solution as stationary phase on a cellulose support. The highest separating efficiency was obtained in 2.7 mm columns with stationary phase loadings of 25-38 percent of the support weight. Maximum separating speed was obtained at k prime equals 5 in the 2.7-mm column, where a mobile phase speed of 3 mm/sec gave H equals 0.5 mm. The influence of stagnant mobile phase was negligible. H was not affected by the amount of sample within the range 0.01 nmole-0.1 micromole in columns with a high counterion concentration.

An increase of the sample volume to 500 microliters (V sub m equals 1.4 ml) decreased the number of theoretical plates by less than 20 percent. Leading of the chromatographic peaks appeared at low sample concentrations due to dissociation of the ion pair in the organic phase. It could be suppressed by a controlled bleeding of the counterion. Quantitative determinations based on the peak area and the molar absorptivity of the ion pair gave recoveries of 95 plus or minus 9 percent with 30-pmole samples. (Holoman-Battelle) W74-01496

ROTAMETER.

For primary bibliographic entry see Field 07B. W74-01500

THERMAL AND BASE-CATALYZED HYDROL-YSIS PRODUCTS OF THE SYSTEMIC FUNGI-CIDE, BENOMYL, California Univ., Davis. Dept. of Environmental

Toxicology.
For primary bibliographic entry see Field 05B. W74-01504

MICROBIAL CULTURE MEDIA PREPARA-TION.

estern Australian Inst. of Tech., Perth. Dept. of Medical Technology. J. D. Neal.

Laboratory Practice, Vol 22, No 7, p 477-495, July 1973. 16 ref.

Descriptors: *Bacteria, Cultures. Identifiers: *Culture media, *Sample preparation.

General guidelines are given based on experience in industrial, educational, and medical laboratories for preparing satisfactory culture media. The effects of storage of media; materials used in preparing media such as water, agar, gelatin, carbohydrates, peptones, meat extracts, blood, serum, plasma, and selective agents; control of pH; sterilization; and media testing on results are discussed. Possible areas of future development are considered. (Little-Battelle) W74-01505

ION SELECTIVE SENSORS, State Univ. of New York, Buffalo. Dept. of Chemistry. G. A. Rechnitz.

Research/Development, Vol 24, No 8, p 18-20, August 1973. 4 fig, 2 tab, 6 ref.

Descriptors: Automation, Heavy metals, *Cadmi-um, *Lead, *Copper, Halides, Enzymes, Urine,

*Electrodes.
Identifiers: *Ion selective electrodes, Miniaturaization, Membrane electrodes, Flow-through electrodes, Serum, Immobilized enzymes, *Silver.

Microsize ion-selective membrane electrodes have been developed which can be used to measure specific ions in human bodies by inserting them with hypodermic needles. Crystal membrane electrodes with tip diameters of 50 microns can detect Ag, Cd, Pb, Cu and halide ions in geological sam-ples. Flow-through electrodes in 'lollipop' shape can detect anions and cations in solutions. These electrodes have proved useful in automated analysis systems where they have replaced optical components. The system operates at 20 to 70 samples per hour and is limited by mechanical components of the system. Future possibilities for ion electrodes are given. (Little-Battelle)
W74-01506

INFRARED STUDIES OF CHLORINATED DIBENZO-P-DIOXINS AND STRUCTURALLY RELATED COMPOUNDS, Food and Drug Administration, Washington, D.C.

Div. of Chemistry and Physics. J-Y. T. Chen.

Journal of the Association of Official Analytical Chemists, Vol 56, No 4, p 962-975, July 1973. 24 fig, 7 tab, 20 ref.

Descriptors: *Pollutant identification, Pollutants, Organic compounds.

Identifiers: *Chlorinated hydrocarbons, *Infrared spectra. *Infrared pectra, *Infrared spectophotometry, Chlorodibenzo-p-dioxins, Chlorodibenzodioxins, Characterization, Dibenzo-p-dioxin, 1-Chlorodibenzo-p-dioxin, 2-Chlorodibenzo-p-diox-Chlorodibenzo-p-dioxin, 2-Chlorodibenzo-p-dioxin, 1 6-Dichlorodibenzo-p-dioxin, 2 3-Dichlorodibenzo-p-dioxin, 2 7-Dichlorodibenzo-p-dioxin, 2 8-Dichlorodibenzo-p-dioxin, 1 2 4-Trichlorodibenzo-p-dioxin, 2 8-Dichlorodibenzo-p-dioxin, 0-Ctachlorodibenzo-furan, 1 2 3 4-Tetrachlorodibenzo-p-dioxin, 1 3 6 8-Tetrachlorodibenzo-p-dioxin, 1 3 6 8-Tetrachlorodibenzo-p-dioxin. Reference infrared spectra of 24 chlorinated dibenzo-p-dioxins (DPD) and structurally related compounds are presented. These reference spectra are recorded using micro quantities of synthesized compounds in order to obtain spectra like those expected from chlorinated DPD residue isolates. The observed characteristic frequencies are tabulated in correlation tables. Their significance is interpreted in terms of the substituents and electronic effects. The positions of various absorption bands depend on the total number and positions of the chlorine substituents. The positions of the absorption bands indicate relative bond strengths. (Holoman-Battelle) W74-01509

DOUBLE PULSE COULOSTATICS, Northern Illinois Univ., DeKalb. Dept. of Chemis-For primary bibliographic entry see Field 02K. W74-01511

GLASS-METAL COMPOSITE ELECTRODES, Louisiana State Univ., New Orleans. Dept. of Chemistry. For primary bibliographic entry see Field 02K. W74-01512

ION-ELECTRODE BASED AUTOMATIC GLU-COSE ANALYSIS SYSTEM,

State Univ. of New York, Buffalo. Dept. of

Chemistry.
R. A. Llenado, and G. A. Rechnitz.
Analytical Chemistry, Vol 45, No 13, p 2165-2170,
November 1973. 8 fig, 5 tab, 24 ref.

Descriptors: *Chemical analysis, *Aqueous solutions, *Automatic control, Laboratory equipment, Research equipment, Carbohydrates, Enzymes, Pollutant identification, Methodology, Proteins, Calibrations, Sampling, Rates, Temperature, Electrodes

Identifiers: Ion selective electrodes, Membrane electrodes, *Glucose, Biological samples, *Con-tinuous flow system, Reproducibility, Precision, Enzymatic techniques, Serum, Iodide electrodes, Chemical interference.

An automated analysis system is described which utilizes a novel flow-through type ion-selective membrane electrode for the enzymatic determination of glucose. The system functions well in conjunction with aqueous, protein-loaded, and serum samples containing glucose in the physiological concentration range at sampling rates of up to 70 determinations per hour. The proposed methodology eleiminates the need for color development or dialysis steps and successfully overcomes protein interference at membrane electrodes via improved electrode design. (Holoman-Battelle) W74-01513

ANALYTICAL APPLICATIONS OF PULSED VOLTAMMETRIC STRIPPING AT THIN FILM MERCURY ELECTRODES, Colorado State Univ., Fort Collins. Dept. of

Chemistry. T. R. Copeland, J. H. Christie, R. A. Osteryoung, and R. K. Skogerboe. Analytical Chemistry, Vol 45, No 13, p 2171-2174,

November 1973. 4 fig, 3 tab, 17 ref.

Descriptors: *Analytical techniques, *Lead, *Cadmium, Pollutant identification, Reliability, Heavy metals, Chemical analysis, Methodology, Water analysis, Urine, Aqueous solutions, *Electrodes. Identifiers: Thin film mercury electrodes, *Vol-tammetry (Differential pulse stripping), Sensitivity, Biological samples, Sample preparation, Ion selective electrodes, Natural waters, Blood, Plasma, Body fluids, Linear scan stripping voltam-

Identification of Pollutants-Group 5A

The use of differential pulse stripping analysis with thin film electrodes for the determination of lead and cadmium in a variety of samples is described. Instrumental and chemical parameters have been thoroughly investigated and optimized for the direct determination of these elements in natural waters, blood, blood plasma, urine. Sample solutions were deoxygenated with prepurified nitrogen while in position in the rotating electrode assembly. Water samples and HNO3 digests of blood were prepared for analysis by adding 2 ml of acetate buffer to 25 ml of sample. Urine and blood plasma samples were prepared as above or by diluting 2 ml of sample and of buffer to 25 ml with distilled, deionized water. The results indicate that reliable analyses are obtained on samples as small as a few microliters under conditions which are more sensitive than linear scan stripping techniques by factors ranging from 4 to 20 or more. (Holoman-Battelle)

SR-87/SR-86 RATIOS AND TOTAL STRONTI-UM CONCENTRATIONS IN SURFACE WATERS OF THE SCIOTO RIVER DRAINAGE

BASIN, OHIO, Miami Univ., Oxford, Ohio. Dept. of Geology. For primary bibliographic entry see Field 05B. W74-01516

BENTHIC MACROINVERTEBRATES AS IN-DEXES OF WATER QUALITY IN WHETSTONE CREEK, MORROW COUNTY, OHIO (SCIOTO RIVER BASIN),

Akron Univ., Ohio. For primary bibliographic entry see Field 05B.

NITROGEN/ARGON RATIOS BY DIFFERENCE

THERMAL CONDUCTIVITY, California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.

J. D. Cline, and S. Ben-Yaakov.

Deep-Sea Research and Oceanographic Abstracts, Vol 20, No 8, p 763-768, August 1973. 3 fig. 1 tab.

Descriptors: *Water analysis, Separation techniques, Sea water, Calibrations, *Nitrogen, *Argon

Identifiers: Dissolved nitrogen, Dissolved argon, *Difference thermal conductivity, Precision, Sample preparation, Accuracy

A method has been developed for the precise determination of dissolved nitrogen/argon ratios in seawater for the purpose of evaluating small changes in the dissolved nitrogen content. Nitrogen and argon are extracted from seawater (in vacuo) and separated from water vapor, carbon dioxide and oxygen. The residual nitrogen-argon mixture is swept over a thermal conductivity detector with a carrier gas of the same composition, except for having a slightly different argon mole fraction. Calibration is carried out by equilibrating seawater at various temperatures with air. The technique has been used successfully in the analysis of N2/Ar ratios from the intermediate depths of the eastern tropical Pacific Ocean and the Cariaco Trench. Precision is estimated at plus or minus 0.2 percent at the 95 percent confidence level; the accuracy depends on the solubility tables used and the method of equilibration. (Little-Battelle) W74-01522

CONCENTRATIONS OF SOME TRACE METALS IN PELAGIC ORGANISMS AND OF MERCURY IN NORTHEAST ATLANTIC OCEAN WATER,

Southampton Univ. (England). Dept. of Oceanography.

For primary bibliographic entry see Field 05C. W74-01523

ELEMENT CONSTITUTION OF SELECTED AQUATIC VASCULAR PLANTS FROM PENNSYLVANIA: SUBMERSED AND FLOAT-ING LEAVED SPECIES AND ROOTED EMER-GENT SPECIES, Pennsylvania State Univ., University Park. Dept.

F. S. Adams, H. Cole, Jr., and L. B. Massie. Environmental Pollution, Vol 5, No 2, p 117-147, September 1973. 17 fig, 6 tab, 15 ref.

Descriptors: "Bioindicators, "Nutrients, Water pollution effects, "Floating plants, "Rooted equatic plants, "Submerged plants, "Metals, Phosphorus, Potassium, Calcium, Manganese, Magnesium, Iron, Copper, Zinc, Sodium, Aluminum, Boron, Aquatic plants, Pondweeds, Statistical methods, "Pennsylvania.
Identifiers: Sample preparation, Emission spectroscopy.

troscopy.

Thirty species of submersed and floating leaved Aquatic Vascular Plants (AVPs) and fiteen species of rooted emergent AVPs were collected from fourty-four and forty-two locations, respectively, in the Delaware, Susquehanna and Allegheny river watersheds in Pennsylvania and analysed by emission spectrometry for element constitution of eleven potentially-polluting ions including: P, K, Ca, Mg, Mn, Fe, Cu, B, Al, Zn, and Na. The purpose was to attempt to identify plants which might serve as bioindicators of water pollution. The areas sampled are widely diverse with respect to geological, geographical, and cultural conditions. geological, geographical, and cultural conditions. Entire plants were collected from strategic locations, washed, blotted dry, wrapped in Kraftpaper towelling and placed in numbered Kraft bags for oven drying. Additional plants were placed in polyethylene bags for identification. Results of elemental analysis were subjected to analysis of variance. Because of their wide occurrence and response to potentially polluting ions, Elodea canadensis, Potamogeton crispus, Myriophyllum exalbescens, Justicia americana and the Sparganiums were selected for additional studies designed to investigate pathways of nutrient assimilation and the effect of nutrient polreproduction. (Little-Battelle)

GROWTH RATES OF SEDIMENT-LIVING MARINE PROTOZOAN AS A TOXICITY IN-DICATOR FOR HEAVY METALS. Leeds Univ. (England). Wellcome Marine Lab.

J. S. Gray, and R. J. Ventilla.

AMBIO, Vol 11, No 4, p 118-121, 1973. 3 fig, 2 tab,

Descriptors: *Growth rates, *Protozoa, *Toxicity, Water quality, "Heavy metals, "Bioindicators, "Bioassay, Animal growth, Water pollution ef-ects, Mortality, Water pollution, Lethal limit, In-vertebrates, Mercury, Zinc, Lead, Salinity, Water temperature, Environmental effects, Laboratory

Identifiers: *Cristigera spp, Median tolerance limit, Data interpretation, Factorial analysis, Cul-

The classical method for measuring the toxicity of a chemical to a marine organism is by the LC50 test. Considerations should be given to the criticisms directed toward the test: (1) duration of the test, (2) survival and subsequent behavior of test organisms, (3) selection of temperature, (4) trophic level of the test organisms, and (5) use of single chemicals as opposed to mixtures as present in nature. In an attempt to allay such criticisms an or-ganism of low trophic level, a bacterivorous ciliate was used and changes in growth rate rather than mortality were measured as criteria of pollution. It was also deemed necessary to investigate responses of test organisms to interacting environmental variables prior to testing chemical toxicity. Using factorial designs and response surface analysis, experimental conditions were optimized with

respect to salinity-temperature combinations. With near optimum conditions the effects of mercuric ions (HgC12), lead ions (Pb (NO3)2) and zinc ions (ZnSO4) were tested each at three concentrations in a 3 to the 3rd power factorial design. HgC12 at an added concentration of 0.0025 ppm reduced growth rate by 9.7 percent, Pb (NO3) at 0.15 ppm by 8.5 percent and ZnSO4 at 0.125 ppm by 8.3 percent. On mixing the chemicals, significant supplemental synergistic effects were found at all two factor and three factor combinations. Models of the effects and graphical response surface contours are given. Since many chemicals are likely to interact (supplementally or antagonistically), the method used seems of widespread relevance to toxicity testing. (Holoman-Battelle) W74-01529

BOTTOM FAUNA AS AN INDICATOR OF WATER QUALITY IN SWEDEN'S LARGE LAKES (LAKES MALAREN, VATTERN AND VANERN),

Uppsala Univ. (Sweden). Inst. of Zoology. For primary bibliographic entry see Field 05B. W74-01531

SILICA GEL MEDIUM FOR ENUMERATION OF PETROLEUMLYTIC MICROORGANISMS IN THE MARINE ENVIRONMENT,

Tokyo Univ. (Japan). Ocean Research Inst. H. Seki.

Applied Microbiology, Vol 26, No 3, p 318-320, September 1973. 2 fig, 1 tab, 11 ref.

Descriptors: *Sea water, Microbial degradation, Marine microorganisms, Oil, Marine bacteria, Water sampling, Cultures, Pacific Ocean, Ecological distribution.

Identifiers: *Enumeration, *Culture media, *Silica gel medium, *Petroleumlytic microorganisms, *Heterotrophic bacteria, Vertical distribution, Marine environment, *Japan (Tokyo Bay).

A silica gel medium was developed for the enumeration of petroleumlytic microorganisms and used aboard the research vessel Hakuho-maru of the University of Tokyo during the Leg KH-73-1 expedition in 1973. Seawater samples were collected with sterilized J-Z type bacteriological samplers (ORIT samplers). Enumerations were carried using a direct microscope count method and a plate count method. Autoclaved Gelman glass fiber filters type A were used to collect microorganisms from 100-ml samples and the inoculated filters were placed on the silica gel media and incubated at 20 C for 30 days before counting colonies. Petroleumlytic bacteria were enumerated by the method employed here in the pelagic region of the Pacific Ocean, as well as in the coastel region of Japan. Petroleumlytic bacteria formed colonies from only 44 samples among the 104 samples from the pelagic region, and usually less than 10 colonies of petroleumlytic bacteria were enumerated for each 100-ml seawater sample from the surface to 1,000 m depth at stations in the western north Pacific central water, whereas more than 10 colonies of the bacteria were enumerated for each 100ml seawater sample in Tokyo Bay. This means that less than 0.001 percent of the total bacteria or less than 0.1 percent of the heterotrophic bacteria are petroleumlytic at the pelagic region. (Holoman-Battelle) W74-01532

VIRUS CONCENTRATION FROM SEWAGE, Baylor Coll. of Medicine, Houston, Tex. Dept. of Virology and Epidemiology. For primary bibliographic entry see Field 05D. W74-01533

Group 5A-Identification of Pollutants

ACRIDINE ORANGE-EPIFLUORESCENCE TECHNIQUE FOR COUNTING BACTERIA IN NATURAL WATERS.

North Carolina Univ., Chapel Hill. School of Public Health.

D. E. Francisco, R. A. Mah, and A. C. Rabin. Transactions of the American Microscopical Society, Vol 92, No 3, p 416-421, July 1973. 6 fig, 2 tab. 12 ref.

Descriptors: *Aquatic bacteria, *Pollutant identification, *Viability, *Ecological distribution, Methodology, Filtration, Fluorescence, E. coli. Identifiers: Acridine orange-epifluorescence technique, *Bacteria counting, Viable count, Membrane filters, Epifluorescence microscopy, Counting chambers, Pure cultures, Acridine orange, Staining, Fluorescence microscopy, Selenastrum capricornutum, Desmids, Bacillus megaterium, Staphylococcus aureus, Azotobacter vinelandii, Klebsiella, Bacillus subtilis, Coulter counter, Petroff-Hauser counter.

The utility of acridine orange staining and epifluorescence microscopy (AO-E) as a method for estimating bacterial numbers in natural waters has been examined. Total direct counts of aquatic bacteria from natural samples were estimated by epifluorescence microscopy after acridine orange staining. Cells were concentrated by membrane filtration on black membrane filters and counted directly. Using this method, bacterial counts of pure cultures corresponded to those obtained by the Petroff-Hauser and Coulter counter methods. Epifluorescence counting is the method of choice for ecological studies of the natural distribution of bacteria in aquatic environments since it permits ready discrimination of bacteria from detritus and does not rely on the adequacy of culture methods to elicit growth of all viable organisms. Total counts obtained in this way were related to glucose and acetate uptake by resident microbial popula-tions of lake water sample. Viable counts of the same samples were not related. (Holoman-Battelle) W74-01534

STUDIES ON METHANOL-OXIDIZING BACTERIA. I. ISOLATION AND GROWTH STUDIES.

Texas Univ., Austin. Dept. of Microbiology. For primary bibliographic entry see Field 05C. W74-01535

INVESTIGATIONS ON THE SHEATHED BACTERIUM HALISCOMENOBACTER HYDROSSIS GEN.N., SP.N., ISOLATED FROM ACTIVATED SLUDGE,
Agricultural Univ., Wageningen (Netherlands).

Lab. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-01539

ISOTOPE FRACTIONATION OF N-15 AND N-14 IN MICROBIOLOGICAL NITROGEN TRANS-FORMATIONS: A THEORETICAL MODEL, California Univ., Riverside. For primary bibliographic entry see Field 05B. W74-01541.

THE CHEMICAL OXYGEN DEMAND OF WATERS AND BIOLOGICAL MATERIALS FROM PONDS,

Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures. For primary bibliographic entry see Field 05C. W74.0154.

RHODOPSEUDOMONAS SULFIDOPHILA, NOV. SPEC., A NEW SPECIES OF THE PUR-PLE NONSULFUR BACTERIA, Groningen Rijksuniversiteit (Netherlands). Dept. of Microbiology. For primary bibliographic entry see Field 05B. W74.01544

PANKHURST TUBES MODIFIED TO IN-DICATE ANAEROBIOSIS, Nairobi Univ. (Kenya).

Nairobi Univ. (Kenya) D. D. Mara.

Laboratory Practice, Vol 22, No 9, p 583, September 1973, 1 fig. 2 ref.

Descriptors: *Anaerobic bacteria, *Anaerobic conditions, Cultures, Laboratory equipment, Indicators.

Identifiers: *Culturing vessels, *Pankhurst tubes.

A second sidearm has been added to the original Pankhurst tube in order to indicate anaerobiosis. This second sidearm would be used for the anaerobic indicator solution when stock cultures of anaerobes are maintained. (Holoman-Battelle) W74-01545

EMISSION SPECTROMETRIC DETERMINA-TION OF TRACE METALS IN BIOLOGICAL TISSUES,

Alabama Univ., Birmingham. School of Medicine. J. Webb, W. Niedermeier, and J. H. Griggs. Applied Spectroscopy, Vol 27, No 5, p 342-347, September/October 1973. 3 fig, 5 tab, 24 ref.

Descriptors: *Trace elements, *Pollutant identification, *Chemical analysis, Hogs, Heavy metals, Alkali metals, Alkaline earth metals, Copper, Aluminum, Manganese, Nickel, Cesium, Strontium, Chromium, Zinc, Lead, Molybdenum, Cadmium, Phosphorus.

Identifiers: *Animal tissues, *Emission spectoscopy, Sample preparation, *Matrix effects, Biological samples, Precision, Heart, Biological materials, Barium, Tin, Wet digestion.

An emission spectometric method of analysis is described which permits duplicate analyses to be performed on 1-g specimens of tissue for 13 elements in the microgram percent range. Pig hearts were dissected into 17 separate pieces representing discrete anatomic sites. Samples were prepared for analysis by low temperature wet digestion. On the basis of their composition of the macro elements sodium, potassium, and phosphorus, these tissues could be divided into two groups: one including blood vessels and heart es, and the other including ordinary and specialized myocardium. A method is described for adjuting the macro element composition of these tissues to that of a common matrix, thus allowing trace metal analysis of both groups of tissues to be performed using only a single set of standards. A solution of the ash was placed in hollow cup graphite electrodes with center posts, evaporated to dryness, and analyzed in the dc arc with a Jarrell-Ash model 66,000 direct reading emission spectrometer. At concentrations above 10 microgram percent the coefficient of variation was about 10 percent for most of the trace metals studied.
(Holoman-Battelle) 74-01546

MICROBIAL FLORA AND LEVEL OF VIBRIO PARAHAEMOLYTICUS OF OYSTERS (CRASSOSTREA VIRGINICA), WATER AND SEDIMENT FROM GALVESTON BAY, Texas A and M Univ., College Station. Dept. of

Animal Science.
For primary bibliographic entry see Field 05C.
W74-01548

LITMUS MILK REACTION AS A DISTINGUISHING FEATURE BETWEEN STREPTOCOCCUS FAECALIS OF HUMAN AND NON-HUMAN ORIGINS,
Tennessee Univ., Knoxville. Dept. of Microbiolo-

gy. J. O. Mundt. Journal of Milk and Food Technology, Vol 36, No 7, p 364-367, July 1973. 4 tab, 38 ref.

Descriptors: *Pollutant identification, *Separation techniques, Chemical reactions, Enteric bacteria, Wildlife, Insects, Public health, Streptococcus, Aerobic bacteria, Methodology, Fermentation.

Identifiers: *Streptococcus faecalis, *Enterococci, *Litmus milk reaction, Pollutant sources, Biochemical tests, Heterotrophic bacteria, Biochemical characteristics, Fecal bacteria, Characterization.

More than 90 percent of 1618 cultures of Streptococcus faecalis obtained from plants, wild animals, and insects produced a soft, reduced, rennet-like curd which underwent stratiform digestion in litmus milk, or else produced no reaction. Cultures of human origin produced a reduced, hard, acidic curd which sometimes was followed by acid-proteolytic digestion. Ten percent of the cultures commensal in nature fermented lactose in litmus milk to produce the hard, acidic curd which sometimes underwent acidproteolytic digestion. One-third of this group of organisms failed to follow the typical pattern of fermentation by S. faecalis of human origin, that is fermentation of melezitose but not of melibiose. It is suggested that for cultures obtained during analytical procedures the reaction in litmus milk and the fermentation of melezitose and melibiose may be employed to distinguish between contamination representing recent pollution of human origin and the presence of S. faecalis as a member of the microflora of plants with no sanitary sig-nificance. (Holoman-Battelle) W74-01549

2,4-DICHLOROPHENOXYACETATE
METABOLISM BY ARTHROBACTER SP.: ACCUMULATION OF A CHLOROBUTENOLIDE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 05B.
W74-01550

SHIGELLA SONNEI ISOLATED FROM WELL WATER,

Iowa Univ., Iowa City. State Hygienic Lab. S. S. Lindell, and P. Quinn. Applied Microbiology, Vol 26, No 3, p 424-425, September 1973. 5 ref.

Descriptors: *Potable water, *Water wells, *Isolation, *Pollutant identification, *Pathogenic bacteria, Methodology, Cultures, Aerobic bacteria, Epidemics, Public health, Human diseases. Identifiers: *Shigella sonnei, Selective media, Culture media, Membrane filters, Xylose-sysine-deoxcholate agar, Triple sugar-iron agar, Lysine-iron agar, Biochemical tests, Eosin methylene blue agar, MacConkey agar, Gram-negative broth, Differential media.

A method is described which led to the isolation of Shigella sonnei from well water suspected of being the primary foci in a school-associated shigellosis outbreak. Tap water samples were filtered by suc-tion through a membrane filter. After filtration the membranes were placed on xylose-lysine-deoxycholate agar plates and incubated at 37C for 18 h. Suspicious colonies were further cultured on triple sugar-iron agar and lysine-iron agar for primary differentiation; only one colony was confirmed biochemically and serologically as Shigella sonnei. Results show that other media are necessary for a more comprehensive isolation of the organism. Further plans for such a study involve filtering smaller samples of the water and hence more membrane filters for inoculation of prescribed media. The membranes will be placed on both selective and differential media such as eosin methylene blue, MacConkey agar, and XLD.
Membranes exhibiting growth will then be placed
in gram-negative broth followed by plating on the above-mentioned media, thus enhancing

Sources of Pollution—Group 5B

chances for isolation of suspected pathogens. (Holoman-Battelle)

COMPARISON OF GELMAN AND MILLIPORE MEMBRANE FILTERS FOR ENUMERATING FECAL COLIFORM BACTERIA,

Tennessee Valley Authority, Chattanooga. Div. of

Environmental Planning. W. G. Presswood, and L. R. Brown. Applied Microbiology, Vol 26, No 3, p 332-336, September 1973. 4 fig. 2 tab, 4 ref.

Descriptors: *Methodology, *E. coli, *Enteric bacteria, Temperature, Water analysis, Isolation, Cultures, Regression analysis, Statistical methods. Identifiers: *Enumeration, *Fecal coliforms, *Membrane filters, Culture media, Data interpretation, Precision, Recovery, Biochemical tests, Gelman membrane filters, Millipore membrane filters, Culturing techniques, Species densitv. Pure cultures.

Tests of two leading brands of membrane filters used for enumerating fecal coliform bacteria showed that Gelman GN-6 filters recovered statistically more colonies of bacteria than did Millipore HAWG 047SO filters from pure cultures incubated at either 35C (the optimal growth temperature) or 44.5C (the standard temperature for the fecal coliform test). Standard membrane filter procedures with M-FC broth base were used to enumerate the organisms. Densities of colonies incubated on Gelman filters at 44.5C averaged 2.3 times greater than those on Millipore filters. Plate counts of the bacteria at both temperatures indicated that incumbation at 44.5C did not inhibit propagation of fecal coliform bacteria. For the pour plates, M-FC broth base plus 1.5 percent agar was used. This modified medium compared favorably to plate count agar for enumerating Escherichia coli. At 35 and 44.5C, colony counts on Gelman filters agreed closely with plate counts prepared concurrently, but Millipore counts were consistently lower than plate counts, especially at 44.5C. Comparative analyses of river water for fecal coliform bacteria by the membrane filter technique gave results comparable to those for the pure cultures. (Holoman-Battelle) W74-01554

A FIRST RECORD OF RED-WATER PHENOMENON IN KASHMIR, INDIA, Kashmir Univ., Srinagar (India). Dept. of Zoology. For primary bibliographic entry see Field 05C. W74-01564

SEPARATION AND IDENTIFICATION OF CAR-BOFURAN, ITS METABOLITES, AND CONJU-GATES FOUND IN FISH EXPOSED TO RING C--14-LABELED CARBOFURAN USING ITLC SIL-ICA GEL STRIPS

Illinois Univ., Urbana. Agricultural Experiment

Station W. N. Bruce.

J Econ Entomol, Vol 65, No 6, p 1738-1740, 1972,

Illus.

Identifiers: *Carbofuran, Carbon-14, Conjugates, Counters, *Fish, Gels, Identification, Insecticide, *Metabolites, Scintillation, Separation, Silica, Spray, Thin layer chromatography.

A single unique technique was developed which effects cleanup, isolation of conjugates, and separation of metabolites found in fish. Using an internal standard technique, carbofuran and its metabolites were visualized as distinct, wellresolved bands by spraying the chromatogram with methanolic KOH and p-nitrobenzenediazonium fluoborate. The reddish-purple bands were cut into small pieces and dropped into scintillation vials for counting.--Copyright 1973, Biological Abstracts, Inc. W74-01577

RELATIONSHIPS OF INDICATOR PATHOGENIC BACTERIA IN ST OR AND STREAM

Detroit Univ., Mich.

For primary bibliographic entry see Field 05B. W74-01645

COMPUTER IDENTIFICATION OF YEASTS OF THE GENUS SACCHAROMYCES, Heroit-Watt Univ., (Soctland). Dept. of Brewing and Biological Sciences.

Journal of General Microbiology, Vol 77, No 1, p 127-135, July 1973. 2 fig, 1 tab, 26 ref.

Descriptors: *Yeasts, *Pollutant identification, *Speciation, *Computers, *Numerical analysis, Fungi, Systematics, Automatic control, Cultures, Biological properties, Computer programs.
Identifiers: "Saccharomyces spp, *Numerical taxonomy, Ascomycetes, Biochemical characteristics, Cell morphology,.

A punched-card system of identification by computer is described, whereby matching at over 85 percent with the description of a recognized Saccharomyces species constitutes identification. The system is based on a set of 39 invariable descriptions of species, so defined that no species is related at higher than 85 percent matching co ficient to any other species. (Holoman-Battelle) W74-01646

5B. Sources of Pollution

THE IMPACT OF WATER POLLUTION ABATEMENT ON COMPETITION AND PRIC-ING IN THE ALABAMA TEXTILE INDUSTRY, Auburn Univ., Ala. Water Resources Research Inst.

For primary bibliographic entry see Field 05G. W74-01101

TRANSIENT MOVEMENT OF WATER AND SOLUTES IN UNSATURATED SOIL SYSTEMS. Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 02G.

WATER QUALITY EVALUATION OF RE-GIONALIZED WASTEWATER SYSTEMS, Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering. For primary bibliographic entry see Field 05D. W74-01107

BIOCHEMISTRY OF ESTUARINE ECOSYSTEM WITH EMPHASIS ON HEAVY METALS AND SHELLFISH, Maryland Univ., College Park. Dept. of Chemis-

For primary bibliographic entry see Field 05C.

W74-01108

HYDROLOGIC NUTRIENT CYCLE INTERAC-TIONS IN UNDISTURBED AND MANIPU-LATED ECOSYSTEMS (WATERSHEDS), New Mexico Univ., Albuquerque. Dept. of Biolo-

gy. For primary bibliographic entry see Field 04C. W74-01110

NUTRIENT SOURCES AND TRANSPORT IN THE UPPER AND CENTRAL REGIONS OF THE SIOUX RIVER, South Dakota Cooperative Fishery Unit, Brookings.
D. C. Hales, and R. L. Applegate.

Available from the National Technical Information Service as PB-225 140/3, \$3.75 in paper copy, \$1.45 in microfiche. South Dakota State University, Brookings, Water Resources Institute Comple tion Report, June 1973. 88 p, 31 fig, 11 tab, 37 ref. OWRR A-029-SDAK (1). 14-01-0001-3842.

Descriptors: *Nutrients, Water quality, *Path of pollutants, Surface waters, *South Dakota, Nitrogen, Phosphates, Water pollution sources. Identifiers: *Big Sioux River (SDak).

The upper Big Sioux River Basin, in northeastern South Dakota, was studied to determine the origin and transport of nutrients in the Big Sioux River. The area was divided into three segments. Two of the segments, the Big Sioux River and Willow Creek Basins, were primarily agricultural drainage areas, and one segment was the city of Watertown. Sampling stations were selected to facilitate the determination of nutrient inputs to the river from each of these segments and to determine the nutrient load in the river leaving the study area. Nutrients studied included total orthophosphate and the particulate and dissolved fractions of organic carbon, organic nitrogen, and total phosphate. The annual load leaving the study area phosphate. The annual local leaving the study area amounted to 1,507,820 kg, 127,320 kg, and 140,310 kg of TOC, TON, and TP, respectively. Approximately 90 percent of the TOC, 87 percent of the TON, and 67 percent of the TP was attributed to the agricultural drainage areas. Eleven percent of the TOC. the TOC, 27 percent of the TON, and 41 percent of the TP was attributed to the city of Watertown. (Wiersma-South Dakota) W74-01115

EFFECTS OF PROTOZOA ON THE FATE OF PARTICULATE CARBON,

Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab. For primary bibliographic entry see Field 05C. W74-01117

MATHEMATICAL MODELING OF NUTRIENT - TRANSPORT

Massachusetts Univ., Amherst. Water Resources Research Center. F. A. Di Giano.

Available from the National Technical Information Service as PB-225 127/0, \$3.00 in paper copy, \$1.45 in microfiche. Publication No 17, 1971. 37 p, 12 fig, 6 ref. OWRR B-005-MASS (3).

Descriptors: *Nutrients, Movement, Surface waters, *Bottom sediments, *Model studies, Analytical techniques, Chemical reactions, Diffusion, Adsorption, Porosity, *Path of pollutants, *Mathematical models, Equations, Water chemistry, Biochemistry, Inorganic compounds. Identifiers: *Nutrient transport.

The derivation of the mathematical models for nutrient transport in deposit-water systems is based upon the mode of physical mass transfer via diffusion and adsorption. The influence of biological and chemical interactions on the transfer are not directly involved. Both porosity and tortuosity of the deposit are physical properties of import. Porosity controls the total flux of nutrients per unit area of deposit. Tortuosity which is a measure of the 'effective' diffusional path, determines the depth of nutrient penetration. Both of these properties may be altered by chemical changes within the bottom deposit. The two primary objectives in seeking a simple but valid model of the system are. (1) to obtain a physical system constant, i.e. and 'effective' diffusion coefficient which can be used to estimate the flux of nutrients through the deposit and the depth of penetration; and (2) to examine the rate-limiting step (steps) of nutrient transport by modeling the interplay of 'interfacial resistance' and pore diffusion and adsorption. The four models described are (1) pore diffusion and homeling transports of the state of the through interstitial water of deposit, (2) interfacial

Group 5B-Sources of Pollution

mass transport, (3) diffusion with simultaneous adsorption, and (4) release of nutrients via diffusion. This last model of simultaneous adsorption and diffusion may be most useful in gaining an un-derstanding of nutrient interchange. (Woodard-W74-01121

HOLBROOK COVE SURVEY--A 1972 STUDENT SUMMER OCEAN ENGINEERING LABORATORY RESEARCH PROJECT. Massachusetts Inst. of Tech., Cambridge.

Available from NTIS, Springfield, Va., 22151 as COM-73-10621 Price \$3.00 printed copy; \$1.45 microfiche. Massachusetts Institute of Technology Sea Grant Project Office Report No MITSG 72-19, December 31, 1972. 162 p, 29 fig, 11 tab.

Descriptors: *Water pollution sources, *Heavy metals, *Mine wastes, *Maine, Data collections, Oceanography, Coasts, Geomorphology, Ocean currents, Tidal effects, Bottom sediments, Computer programs, Path of pollutants, Ecology. Identifiers: *Holbrook Cove (Me).

This report is the first of two volumes concerning the accomplishments of the 1972 M.I.T./Maine Maritime Academy Sea Grant Summer Ocean Engineering Laboratory. It describes the investiga-tions students conducted in an oceanographic and biological survey of Holbrook Cove, Maine, in July 1972. The objective of the survey was to gain an understanding of the hydraulics and ecology of the coves in order to ascertain the effect of heavy metal pollution from the Callahan mine outfall. Holbrook Cove is located approximately one-half mile southwest of Castine, Maine. Data for study projects include: tidal current streamlines and velocity; temperature and salinity; chlorophyll 'A' content; benthic infauna distribution; tidal height fluctuations; detailed bottom topography; bottom soil structure; and water oxygen content. Computer programs are presented in the appendix.
(Woodard-USGS) W74-01131

URBANIZATION AND ITS EFFECTS ON REGIMEN AND QUALITY OF SURFACE WATERS (URBANIZATSIYA I YEYE WATERS (URBANIZATSIYA I YEYE VLIYANIYE NA REZHIM I KACHESTVO POVERKHNOSTNYKH VOD),
Gosudarstvennyi Gidrologicheskii Institut, Lenin-

grad (USSR). For primary bibliographic entry see Field 04C. W74-01139

INVESTIGATIONS ON THE INFLUENCE OF TIDES ON SALINITY, CONTENT OF SUSPENDED MATTER, SEDIMENTATION AND BACTERIA COUNTS IN THE ELBE ESTUARY, CUNTERSUCTUNIES IN THE ELBE ESTUARY, CUNTERSUCTUNGEN UBER DIE EINWIRKUNG DER TIDE AUF SALZGEHALT, SCHWEBSTOFFGEHALT, SEDIMENTATION UND BAKTERIENGEHALT IN DER UNTERELBE),
Kiel Univ. (West Germany). Institut fuer

Meereskunde

For primary bibliographic entry see Field 02L. W74-01175

ON THE SMALL-SCALE HORIZONTAL DIFFU-SION NEAR THE COAST, Japan Atomic Energy Research Inst., Tokyo.

N. Ito.

Journal of the Oceanographical Society of Japan, Vol 19, No 4, p 182-186, January 1964. 3 fig, 1 tab, 4 ref.

Descriptors: Dye releases, *Coasts, *Diffusion, Radioactive wastes, Pollutant identification, Dilution, *Path of pollutants. Identifiers: Japan (Tokaimura).

Several small-scale dve-release experiments. which were carried out off Tokaimura by Japan Atomic Energy Research Institute and other research institutes, are described. The results showed that the diffusion constant defined in this paper was approximately fitted in all the experiments performed and the horizontal concentration distribution of released material could be estimated, using the constant. These may be applicable in the problem of environmental safety around atomic establishments to estimate the dilution of radioactive effluent diffusing into sea water. (Sin-W74-01186

A STUDY OF TIDAL DISPERSION IN THE POTOMAC RIVER, Federal Water Pollution Control Administration,

Annapolis, Md. Chesapeake Bay-Susquehanna River Basin Project.

L. J. Hetling, and R. L. O'Connell.
Water Resources Research, Vol 2, No 4, p 825-841, 1966, 12 fig. 3 tab. 7 ref.

Descriptors: *Potomac River, *Estuaries, *Dispersion, Water pollution sources, Density currents, *Tidal effects, Dye dispersion, Tracers, *Outfall sewers, *Path of pollutants.

A dye tracer experiment was performed to determine the dispersive properties of the Potomac estuary. A fluorescent dye, Rhodamine WT, released continuously for 13 days through a submerged outfall sewer, was traced effectively over the upper 25 miles of the estuary for 34 days. Observed dye distributions were analyzed using a classical 1-dimensional advection-diffusion model applied to each of 16 discrete volume segments. Repetitive analog computer solution of the resulting set of 16 linear differential equations showed that dispersion coefficients increasing from 0.2 to 0.6 sq mi/day in a downstream direction gave a satisfactory temporal and spatial description of the observed dye distribution. The dye loss in the estuary was found to be described by a first-order reaction rate constant that had an upper limit of 0.034 day-1. The effect of river inflow on the distribution of a nonconservative pollutant from a point source discharge was calculated using the model. (Sinha-OEIS) W74-01196

COMPUTER SIMULATION OF ESTUARIAL NETWORKS.

California Univ., Berkeley, Dept. of Civil Engineering. For primary bibliographic entry see Field 02L. W74-01197

EXPERIMENTS AND HYDROGRAPHIC SUR-VEYS OFF SANDY HOOK, NEW JERSEY (1963). Lamont-Doherty Geological Observatory.

Palisades, N.Y. For primary bibliographic entry see Field 02L.

INVESTIGATIONS ON THE CHANGES IN THE CONTENT OF HEAVY METALS IN LAKE WATERS OF THE MASURIAN LAKE DIS-

TRICT, Wyzsza Szkola Rolnicza, Olsztyn-Kortowa (Po-land). Instytut Hydrobiologii Ochrany Wodnego. F. Wieclawski.

Acta Hydrobiol. Vol 14, No 2, p 149-163, 1972. Il-

Identifiers: *Heavy metals, *Zinc, Lakes, *Poland (Masurian Lake Dist.), Water pollution sources.

Waters from 2 levels of lakes of the Masurian Values 10th 2 revers to makes of the Massimules Lake District (Poland) were investigated from 13th Nov. 1967 to 13th May 1968 for the content of traces of heavy metals in ionic form. The chosen lakes (Trzcinno, Kortowskie, Mutek, Starodworskie and Dlugie) represent types from Betamesotrophy to advanced eutrophy remaining under the influence of pollution. The range of variations in the content of traces of ions of heavy metals in microgram/1 determined according to the polarographic method after their preliminary concentration on a dithizone column is the following: Pb 0.2-2.2, Cd 0.0-0.3, Zn 0.2-9.7, Mn 0.0-9.8, Cu 0.1-4.5. Co<0.1. These microelements, ordered in a sequence of decreasing concentrations, form the wing series: Mn, Zn, Cu, Pb, Cd, and Co. Mn and Zn showed the greatest seasonal variability and Pb the least. The occurrence of a larger amount of microcomponents of waters, particularly distinct for Zn. was observed 3 times in the course of these investigations, namely during the period of culminant inflows of waters from the catchment basins to the lakes, and in the early season of spring 'blooms' of lake waters. No passing of ions of heavy metals from sediments to water was observed.—Copyright 1973, Biological Abstracts, Inc. W74-01221

THE EFFECT OF MICROBIAL ACTIVITY UPON THE SEDIMENTARY SULPHUR CYCLE, University of the South Pacific, Suva (Fiji).
D. B. Nedwell, and G. D. Floodgate.

Mar Biol (Berl). Vol 16, No 3, p 192-200. 1972. Il-

Identifiers: *Microbial activity, *Sulfur cycle, Sulfates, *Intertidal sediments.

The sulfate content of an intertidal sediment at Anglesey (UK) varied during the year, the sulfatereducing activity of the microbial population being limited by low temperature during winter, and by the low numbers of sulfate-reducing bacteria during May, 1969. A corresponding annual variation of the sedimentary sulfide could not be demonstrated, and the sulfide which was formed biologically during the course of the year was almost en-tirely lost from the sediment. This loss of sulfide was probably due to subsurface oxidation; and flushing, by water entering at the base of the sediment. It is suggested that sulfide was only precipitated within the sediment during summer when sulfate reduction was active.--Copyright 1973, Biological Abstracts, Inc.

SOME OBSERVATIONS ON BACTERIAL POPULATIONS IN WILGREEN LAKE, MADIS-

ON, KY., Eastern Kentucky Univ., Richmond. Dept. of Biological Sciences. R. B. Otero, and S. Leung.

Trans Ky Acad Sci. Vol 33, No 1/2, p 16-26, 1972, Illus

Identifiers: *Bacterial populations, Cattle, *Fecal coliforms, *Kentucky (Wilgreen Lake), Lakes, Water quality standards.

Wilgreen Lake is being polluted by several important sources: Old Town Branch which flows into Wilgreen Lake from the southern end, Taylor Fork Creek which enters Wilgreen Lake from the eastern end, septic tank leakage from housing development on the eastern tip of the lake, cattle which graze along the shorelines of the lake and tributaries, the creek along Route 52 coming from the University Shopping Center-Lancaster Woods Estate which eventually empties into Taylor Fork Creek, an aeroflow disposal plant on the tributary which flows into the lake from the western end. Fecal coliforms ranged from a low of 100/100 ml at many stations to a high of 100,00/100 ml at Station 43 in Oct. Total coliforms ranged from about 100/100 ml at several stations to 1.3 x 107/100 ml at Station 43 in Oct. Of the 192 samples tested for total coliform, all but 24 (87%) were higher than the 1000 organisms/100 ml allowed by the Proposed Standards for Water Quality of the Kentucky Water Pollution Control Commission, 1971.--Copyright 1973, Biological Abstracts, Inc.

Sources of Pollution—Group 5B

W74-01242

SURVIVAL OF COLIFORM BACTERIA IN NATURAL WATERS: FIELD AND LABORATO-RY STUDIES WITH MEMBRANE-FILTER CHAMBERS,

Montana State Univ., Bozeman. Dept. of Botany

and Microbiology.
G. A. McFeters, and D. G. Stuart.
Appl Microbiol. Vol 24, No 5, p 805-811. 1972, II-

Identifiers: *Bacteria, *Coliform, Field studies, Laboratory studies, *Montana (Middle Creek), Natural water, Survival, *Membrane filter cham-

Chambers with membrane-filter side walls were designed for studies of the survival of coliform bacteria in natural and artificial waters. Experiments were carried out in the field and in the laboratory. The initial uptake rate of inorganic ions, total carbon and glucose into the chamber was greater than twice as fast as the accumulation of each into dialysis tubing. When the survival of a water-isolated fecal coliform bacterium was examined in 2 adjacent mountain streams, the organism persisted longer in Bozeman Creek than in Middle Creek, Montana. These data may be a reflection of the water chemistry because the concentration of inorganic constituents of the former was greater. Laboratory studies of the survival of a fecal coliform bacterium in artificial and natural water with continuous flow were used to deter-mine the effect of chemical composition, temperature and pH. The relation of this type of data to the use of fecal coliform bacteria as indicators of health hazard in water is discussed.--Copyright 1973, Biological Abstracts, Inc. W74-01250

ADSORPTION OF COLLOIDAL IRON BY BAC-

TERIA, Queensland Univ., Brisbane (Australia). Dept. of Microbiology.
I. C. Macrae, and J. F. Edwards.

Appl Microbiol. Vol 24, No 5, p 819-823. 1972, Il-

Identifiers: *Adsorption, *Bacteria, Caulobacter, Colloidal iron, Corynebacterium-Pseudodiphtheriticum, Escherichia-Coli, *Iron, Klebsiella-Pneumoniae, Micrococcus, Mycobacterium-Phlei, Pseudomonas-Fluorescens.

The adsorption of iron from a positive-iron sol by species of 7 bacterial genera (Caulobacter, Micrococcus, Pseudomonas fluorescens, Micrococcus, Pseudomonas fluorescens, Mycobacterium phlei, Escherichia coli, Klebsiella pneumoniae and Corynebacterium pseudodiphtheriticum) was examined by electron microscopy. All species precipitated the iron from the sol and the bacterial cells became encrusted with iron. This was related to iron deposition in surface water supplied.—Copyright 1973, Biological Abstracts, Inc. W74-01253

A WATERBORNE ACTINOMYCETE RESEM-BLING STRAINS CAUSING MYCETOMA, Unversity of the Witwatersrand, Johannesburg

(South Africa).

E. N. Lawson, and L. M. Davey.

J Appl Bacteriol. Vol 35, No 3, p 389-394, 1972.

Identifiers: Actinomadura-Madurae, *Actinomycetes, *Mycetoma, *South Africa, Organic pol-

An actinomycete, closely resembling strains of Actinomadura madurae causing mycetoma, was isolated from a stream in South Africa. The organism was present in all water samples collected monthly for 1 yr. It is considered to be indigenous in the stream because its population density was not influenced by water run-off from the soil into the stream or by organic pollution.--Copyright 1973, Biological Abstracts, Inc. W74-01256

RELATIONSHIPS BETWEEN TURBIDITY AND HYDROGRAPHICAL FACTORS IN FRESH AND BRACKISH WATER REGION OF THE ELBE ESTUARY, (IN GERMAN), I. Noethlich.

Arch Hydrobiol Supplement B. Vol 43, No 1, p 1-

32. 1972, Illus, (English summary). Identifiers: *Brackish water, *Germany (Elbe estuary), Hydrographical studies, Phytoplankton, *Turbidity, *Zooplankton, Estuaries

For hydrographical reasons a turbidity zone is formed in the brackish-water region of the Elbe estuary, West Germany. This zone contains remains of the limnic production of phyto- and zooplankton as well as of marine sediments. The location of this zone is correlated with the inflow of fresh water from the river. The tidal currents as well as the amount of vertical turbulence are of great importance for the distribution of suspended Much vertical turbulence, and also the morphology of the estuary bottom form patterns of suspended matter, which often drift to the surface building up clouds of turbidity. These patches are soon destroyed by waves and by the force of tidal currents.--Copyright 1973, Biological Ab-W74-01260

THE OXYGEN STATUS OF LAKE SEDIMENTS, For primary bibliographic entry see Field 02J. W74-01266

LOSS OF PHOTOSYNTHETIC ACTIVITY IN TWO BLUE-GREEN ALGAE AS A RESULT OF OSMOTIC STRESS,

York Univ., Downsview (Ontario). Dept. of Biolo-

B. Grodzinski, and B. Colman.

Journal of Bacteriology, Vol 115, No 1, p 456-458, July 1973. 1 fig, 1 tab, 11 ref.

*Cultures. Descriptors: *Photosynthesis, Cyanophyta, Anabaena. Identifiers: Culture media, *Anacystis, *Coccochloris, Mannitol, Gleocapsa, Oscillatoria.

Spheroplasts of the blue-green algae Anabaena flos-aquae, Anacystis nidulans, Gleocapsa al-picola, Coccochloris peniocystis, and Oscillatoria sp. were prepared using lysozyme in mannitolbuffer. Photosynthetic rates were determined for the spheroplasts in the mannitolphosphate buffer, for untreated cells suspended in the same buffer, and for untreated cells suspended in phosphate buffer by manometric measurement of oxygen evolution or by measurement of C-14 from labeled NaHCO3. No effects were noted for Anabaena, Oscillatoria, or Gleocapsa. However, with Anacystis and Coccochloris the photosynthetic rates for spheroplasts and cells in mannitol-phosphate buffer were much lower than that of cells in phosphate buffer. Washing of cells failed to produce recovery of photosynthetic ac-tivity and a fluorescent material identified as pteridine was found in the incubation medium. The quantity of pteridine was proportional to the loss of photosynthetic activity. Similar results were obtained with other compounds exerting osmotic pressure comparable to that of mannitol. These compounds were: sucrose, D-glucose, D-sorbitol, and fructose. (Little-Battelle) W74-01302

NATURAL DISPERSION OF MERCURY FROM PUHIPUHI, NORTHLAND, NEW ZEALAND, Massey Univ., Palmerston North (New Zealand). Dept. of Chemistry and Biochemistry. F. E. Hoggins, and R. R. Brooks.

New Zealand Journal of Marine and Freshwater Research, Vol 7, Nos 1-2, p 125-132, June 1973. 2 fig, 1 tab, 16 ref.

Descriptors: *Mercury, Ecological distribution, *Path of pollutants, *Pollutant identification,

Chemical analysis, Oysters, Mussels, Soil analysis, Heavy metals, Pollutants, Mollusks, Aquatic soils, Sediments, Bottom sampling. ampling.

Identifiers: *New Zealand (Wairua River), Animal tissues, Cockles, Crassostrea glomerata, Paphies australe, Perna canaliculus, Wairoa River, Chione strutchburyi, Foot, Gills, Mantle, Shell, Viscera.

The mercury content of sediments and water in the Wairua (Wairoa) River, Northland, and of mol-luscs from the estuary of the river was determined to establish the extent of natural dispersion of mercury from deposits at the source of the river at Puhipuhi. The mercury content per gram wet weight of cockles, Chione stutchburyi, (0.032 ppm); rock oysters, Crassostrea glomerata, (0.081 ppm); pipi Paphies australe, (0.019 ppm); and green-lipped mussles, Perna canaliculus, (0.017 ppm) was compared with that of specimens of the ame species from other areas where presumably only background concentrations exist. Mercury could be detected in sediments at least 35 km from the deposits, but in water only up to about 8 km. Normal background levels were established for the soft parts and individual organs of the four species of molluscs investigated; of the molluscs found in the estuary of the Wairua River, only C. glomerata had anomalous amounts of mercury, but whether this indicates abnormally high mercu ry levels in the environment is unknown, because many other factors still need to be evaluated. Mercury levels of all molloscs were well below the generally accepted safety level of 0.5 ppm for fish for human consumption. (Holoman-Battelle) W74-01307

FATE OF LIGNIN IN KRAFT EFFLUENT TREATMENT,

Foronto Univ. (Ontario). Dept. of Civil Engineer-

ing. J. Ganczarczyk.

Journal Water Pollution Control Federation, Vol 45, No 9, p 1898-1907, September 1973. 2 fig, 6 tab, 20 ref.

Descriptors: *Fibers (Plant), *Pulp wastes, *Activated sludge, *Sewage treatment, Waste water (Pollution), Effluents, Waste water treatment, Methodology, Aeration, Biological treatment, Chemical analysis, Chemical reactions, Industrial wastes, Organic compounds, Pollutant identifica-

tion, Water analysis, *Sorption. Identifiers: *Lignin, *Fate of pollutants, Biotransformation, Kraft black liquor, Indulin ATR solutions, Pollutant removal, Organic carbon, Methox-

vl. Oxidative condensati

The purpose of this study was to obtain additional experimental support for the hypothesis that the in mechanism of lignin removal in activated sludge treatment is by sorption, as well as to receive some insight into the possible chemical and biochemical transformations of lignin in this process. To achieve this purpose the aeration of kraft black liquor and indulin ATR solutions without any biological growth was studied. The laboratory experiments on activated sludge treat-ment of kraft black liquor solutions also were continued at very low loadings of aeration tanks and activated sludge. In addition, several chemical analyses of activated sludges from these experiments and from various technical installations were performed. The experiments showed that simple aeration of alkaline solution of kraft black liquor in the absence of biological growth and aeration of indulin ATR solutions precipitated some organic material and decreased pH, color, and nitrosolignin reaction possibly by oxidative condensation of lignin molecules. Lignin accumulated in sludge may be released into solution. Accumulation of lignin in the sludge may vary substantially. The accumulated material seems richer in methoxyl than the kraft lignin precipitate; thus, some selective transformation of lignin material may occur during activated sludge treatment. (Holoman-Battelle)

Group 5B-Sources of Pollution

W74-01320

THE IMPORTANCE OF CHELATING AGENTS IN NATURAL WATERS AND WASTEWATERS, Missouri Univ., Columbia.

S. E. Manahan, and M. J. Smith. Water and Sewage Works, Vol 120, No 9, p 102-106, September 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Heavy metals, Waste water (Pollution), *Water analysis, *Pollutant identification, *Chelation, Nitrilotriacetic acid, Chemical analysis, Amino acids, Methodology, Water pollution, Humic acids, Metals, Water pollution sources, Iron, Manganese, Copper, Zinc, Cobalt, Nickel, Cadmium, Mercury, Lead, Pollutants, Ions, Sewage effluents.

Identifiers: *Chelating agents, Natural waters, *Metal chelates, Complexation, Detergent builders, Ethylenediaminetetraacetic acid, Atomic absorption spectrophotometry, Chemical interference, Sodium citrate, Polyphosphates, Polypeptides, Leucine, Valine, Alanine, Serine, Glutamic acid, Aspartic acid, Tyrosine, Histidine, Glycine, Cysteine, Ionic interference.

Chelation drastically changes the behavior of a metal ion in water. Some of the most important metals that form very stable chelates in water are Mn, Fe, Co, Ni, Cu, Zn, Cd, Hg, and Pb. Each of these must be considered in some way in the maintenance of water quality and the selection of suitable water supplies. Whether or not a particular chelating agent in water will chelate a given metal ion in water depends upon pH, the presence of species forming insoluble compounds with the metal, and the presence of metal ions which will compete for the chelating agent. Sources of chelating agents include detergent builders, proteinaceous wastes, sewage effluents and the naturally occurring plant degradation products, the humic acids. Whenever conventional wastewater treatment processes fail to remove metals, the presence of chelates should be considered. An atomic absorption method is presented for the analysis of heavy metal chelating agents in water and a brief discussion given of chemical interference, with special emphasis on iron interference. (Holoman-Battelle) W74-01326

N-NITROSATION BY NITRITE ION IN NEUTRAL AND BASIC MEDIUM,

National Cancer Inst., Bethesda, Md. Div. of Cancer Cause and Prevention.

L. K. Keefer, and P. P. Roller. Science, Vol 181, No 4106, p 1245-1247, September 1973. 1 fig, 23 ref.

Descriptors: *Water pollution effects, *Chemical reactions, Hydrogen ion concentration, Aqueous solutions, Nitrites, *Path of pollutants.

Identifiers: *Nitrosation, *Nitrosamines, *Carcinogens, Amines, N-nitrosation, Formaldehyde, Chloral, Diethylamine, Pyrrolidine, Piperidine, Dimethylamine, Di-n-propylamine, Diisopropylamine.

Studies with aqueous buffer solutions of diethylamine and sodium nitrite showed that formaldehyde catalyzed the production of diethylnitrosamine at room temperature over the entire pH range studied (pH 6.4 to 11.0). Additional studies with other secondary amines (pyrrolidine, piperidine, dimethylamine, din-propylamine, and diisopropylamine) showed that formaldehyde chloral catalyzed N-nitrosation of these compounds. A mechanism for the reaction is proposed and demonstrated. It is concluded that significant synthesis of N-nitrosa compounds must be considered possible even in nonacidic media since formaldehyde, chloral, and other aldehydes are common industrial by-products or wastes. (Little-Battelle) W74-01328

ETHYLENETHIOUREA DEGRADATION. FMC Corp., Princeton, N.J. Niagara Chemical Div.

A. Cruickshank, and H. C. Jarrow. Journal of Agricultural and Food Chemistry, Vol 21, No 3, p 333-335, May/June 1973. 3 fig, 4 tab, 11 ref.

Descriptors: *Degradation (Decomposition), *Hydrolysis, Environmental effects, Ultraviolet radiation, *Fungicides, Thiocarbamate pesticides, Hydrogen ion concentration, Aqueous solutions, Pollutant identification, Methodology, Carbamate pesticides, Stability, Temperature.

pesticides, Stability, Temperature. Identifiers: *Photolysis, *Ethylenethiourea, *Fate of pollutants, Degradation products, Silica gel, Photodecomposition, Bis (imidazolin-2-yl)sulfide, Photosensitizers, 1-Acetonaphthone, Eosin, 1-Naphthaldehyde, trans-Stilbene, Methylene blue, Flavone, Benzophenone, Benzil, Carbazole, 2-Imidazolidinethione, 2-Imidazolidone, Crystal violet, Thin layer chromatography, Chromogenic reagents, Autoradiography.

A laboratory study was conducted on the photolytic and hydrolytic degradation of etylenethiourea (ETU), an ethylenebisdithiocarbamate fungicide. Photolysis was studied on a solid substrate (silica gel) and in aqueous solution; hydrolysis was studied over a pH range of 5.0-9.0. Ultraviolet irradiation (above 285 nm) of ethylenethiourea (ETU) on silica gel gave 2: mindazolidone as the major identifiable product. Several other products were formed, of which only bis (imidazolid-2-yl) sulfide has been identified. The 2-imidazolidone does not appear to undergo further degradation under these conditions. Decomposition of ETU is rapid, particularly in the presence of photosensitizers. Aqueous solutions of ETU undergo a very slow photolysis, which is markedly accelerated by sensitizers. ETU is stable to hydrolysis over the pH range 5.0 to 9.0 at 90°C. (Holoman-Battelle)

SEASONAL VARIATION OF CHEMICAL PARAMETERS IN ALASKAN TUNDRA LAKES, Skidmore Coll., Saratoga Springs, N. Y. Dept. of Biology.

H. H. Howard, and G. W. Prescott. American Midland Naturalist, Vol 90, No 1, p 154-164, July 1973. 2 fig, 3 tab, 37 ref.

Descriptors: Tundra, *Water chemistry, *Alaska, Water sampling, Chemical analysis, Supersaturation, Chemical properties, Water properties, Shallow water, Lakes, Alkalinity, Dissolved oxygen, Bicarbonates, Hydrogen ion concentration, Chlorides, Hardness (Water), Calcium, Magnesium, Sulfates, Calcium carbonate, Methodology, *Ice cover, Thawing, Water analysis, Water quali-

Identifiers: Imikpuk Lake (Alas), Ikroavik Lake (Alas), *Seasonal variation, *Tundra lakes.

Chemical parameters were monitored for 20 months in two shallow lakes near Barrow, Alaska. After formation of an ice cover, all parameters, except dissolved oxygen and pH, increased to a maximum at time of maximum ice depth. The pH values were essentially the inverse of other parameters after an ice cover was formed. Dissolved oxygen increased to supersaturation values in January and then gradually decreased until photosynthetic rates became significant. The lakes did not become anaerobic at any time. During and immediately after thawing, dissolved oxygen was near saturation and all other solutes (except pH) fell to minimum values. After this low point, concentrations began to increase toward another maximum in the following year. Solutes may be concentrated up to about 30 times by the thick ice cover. Ratios of solutes deviated widely from mean world values, probably because of the close proximity of the lakes to the ocean. Imikpuk, nearer to the ocean, had most ratios closer to ocean values. Seasonally, except at the time of the

thaw, ratios were essentially constant except for Cl/HC03. Cl/HC03 decreased after ice formation and until photosynthetic rates became significant. During ice melt, ratios differed from values at other times, possibly because of differential occlusion of solutes in ice. (Holoman-Battelle) W74-01347

STUDIES OF RAPID NTA-UTILIZING BAC-TERIAL MUTANT, Department of the Environment, Burlington (On-

Department of the Environment, Burlington (On tario). Centre for Inland Waters.
D. Liu, P. T. S. Wong, and B. J. Dutka.

Journal Water Pollution Control Federation, Vol 45, No 8, p 1728-1735, August 1973. 6 fig, 14 ref.

Descriptors: *Nitrilotriacetic acid, *Microbial degradation, *Cultures, *Pseudomonas, *Absorption, *Respiration, Bioassay, Waste water (Pollution), Oxidation, Separation techniques, Systematics, Isolation.

Identifiers: Ion transport.

A bacterial mutant with high affinity for NTA was isolated from wastewater after ultraviolet mutagenization and penicillin selection. Isolates were cultured in an NTA solution to study respiration, uptake (with C-14-labeled NTA), and morphological and biochemical characteristics. Specimens were examined by electron microscopy. Morphological and biochemical characteristics of the mutant suggest that it is a Pseudomonas sp. The rate and amount of oxygen utilization is a function of NTA concentration with 99 percent of an initial concentration of 514 mg NTA/1 being oxidized within 3 hours. Optimum degradation occurs at 25 C and is significantly lowered at 10 and 4C. The mutant prefers NTA to wastewater with the rate of oxidation 5 times faster with NTA than with wastewater. The uptake studies suggest that NTA might enter the mutant via a specific transport protein. (Little-Battelle)

PEAT FLOATING IN THE RESERVOIR OF THE KIEV HYDROELECTRIC STATION AND ITS ROLE IN WATER CONTAMINATION, (IN RUSSIAN).

Akademiya Nauk URSR, Kiev. Insytut Botaniki.

L. S. Balashov. Ukr Bot Zh., Vol 29, No 1, p 49-54. 1972. Illus.

(English summary).

Identifiers: Alder, Contamination, Dryopteris-Thelypteris, Electric power, *Peat, Phragmites, Communis, Reservoirs, Seasons, Sphagnum, Typha-Angustifolia, *USSR (Kiev hydroelectric station), Willow.

In 1967-1968, islands of the upper layer of peat deposits (up to 0.5 m) were observed near the western shoreline within the limits of the Chernobyl district (USSR); in 1969-1970, islands existing for some years (peat thickness: up to 1.5-2.0 m) as well as peat island annually floating and sinking in autumn were found. Weak- and medium-decayed peat containing Sphagnum remains come to the surface from depth of 0.7-1.0 up to 2.5-3.0 m, in the area of some m2 to 0.15-0.2 ha. Floating occurs in the second half of summer. The plant cover consists of rhizome herbs, annuals are less frequent. On the perennial islands there occurs sprout adler and willow with thickets of Phragmites communis, Dryopteris thelypteris and Typha angustifolia. Preventive measures are necessary against peat floating before reservoir is built (clearing of bed).—Copyright 1973, Biological Abstracts, Inc.

MERCURY IN THE ENVIRONMENT--A GLOBAL REVIEW INCLUDING RECENT STU-DIES IN THE DELAWARE BAY REGION, Delaware Univ., Newark. Coll., of Marine Stu-

F. K. Lepple.

Sources of Pollution-Group 5B

Available from NTIS, Springfield, Va 22151, COM-73-10620 Price \$3.00 printed copy; \$1.45 microfiche. Report DEL-SG-8-73, March 1973. 75 p, 3 fig, 7 tab, 153 ref. NOAA-SG-3-35223.

Descriptors: *Water pollution sources, *Mercury, *Surface waters, *Sediments, *Delaware, Bays, Atmosphere, Toxicity, Chemical analysis, Analytical techniques, Data collections, Sampling, Environmental effects, Environmental control, Evaluation, Oceans, Rivers. Identifiers: *Delaware Bay region.

The first section of this two-part report reviews basic properties of mercury and its compounds as related to their effect on various facets of the environment. Among the topics discussed are the chemical forms and hazards of mercury, incidents of mercury contamination, governmental stan-dards and tolerance limits, levels of mercury in the atmosphere, biosphere, lithosphere and hydro-sphere, and the flux through each segiment. The ality of the 'mercury problem' globally and locally is evaluated. A comprehensive review of the accepted methods of analyses for mercury and its compounds is also presented. The second section reports on recent studies of mercury levels in the Delaware Bay region and compares the concentrations found in the waters and sediments to values from other areas. Mercury levels tend to decrease near the mouth of the bay and again reach minimum value of 0.1 ppb near Dewey Beach, approximately 8 miles south of Cape Henlopen. Relatively high concentrations (0.4 to 0.5 ppb mercury) were in the region near the center of the bay. (Woodard-USGS) W74-01373

CONTRIBUTION TO BIOLOGICAL AND CHEMICAL STUDY OF THE PORT OF OSTENDE, (IN FRENCH), Brussels Univ. (Belgium). Laboratorium voor

Ekologie en Systematiek.

J. Podamo.

Ann Soc R Zool Belg. Vol 102, No 1/2, p 105-127.

1972, Illus, (English summary).
Identifiers: Bacteria, *Belgium (Ostende harbor),
*Biological studies, *Chemical studies, Phytoplankton, Pollution, Ports, Zooplankton, Harbors, Sampling, Outfall sewers, Water stratifi-cation, Water pollution sources.

A biological and chemical study was made on the harbor of Ostend (Belgium). The harbor was surveyed on the 6th of Aug. 1970 at low water and high water. Samples were taken at various depths for chemical analysis, bacteriological, phytoplankton and zooplankton investigations. All the results demonstrate an obvious water stratification and heavy pollution by sewage outfalls and inland water.—Copyright 1973, Biological Abstracts, Inc. W74-01384

A STUDY OF THE EXCHANGE OF DISSOLVED SOLIDS BETWEEN BOTTOM SEDIMENTS AND WATER OF DIFFERENT WATER BODIES (IZUCHENIYE OBMENA RASTVORENNYMI VESHCHESTVAMI MEZHDU DONNYMI OT-LOZHENIYAMI I VODOY RAZLICHNYKH

VODOYEMOV), Moscow State Univ. (USSR). Chair of Hydrology. For primary bibliographic entry see Field 02J. W74-01389

CONCENTRATIONS OF DISSOLVED FORMS OF FE, MN, AND CU IN MARINE PORE WATERS OF THE ATLANTIC BASIN (KONT-SENTRATSII RASTVORENNYKH FORM FE, MN, I CU V MORSKIKH, POROVYKH VODAKH BASSEYNA ATLANTICHESKOGO OKEANA), Akademiya Nauk SSSR, Kaliningrad. Institut

For primary bibliographic entry see Field 02K. W74-01392

CHLORINATED HYDROCARBON INSECTI-CIDES IN SEDIMENTS OF SOUTHERN LAKE

MICHIGAN, Illinois Univ., Urbana. Dept. of Civil Engineering. H. V. Leland, W. N. Bruce, and N. F. Shimp. Environmental Science and Technology, Vol 7, No 9, p 833-838, September 1973. 7 fig, 1 tab, 22

Descriptors: Sediments, *DDT, *Distribution patbeautipurs: Seuments, "Dift, "Distribution parterns, "Organic matter, Particle size, Particle shape, DDD, DDE, Dieldrin, "Degradation (Decomposition), "Lake Michigan, "Gas chromatography, Sampling, Statistical methods, Separation techniques, Laboratory equipment," I ake sediments Lake sediments.

Identifiers: Lindane, Heptachlor epoxide, Sample preservation, Sample preparation, Dechlorination, Electron capture detectors.

profile was developed of the extent of chlorinated hydrocarbon contamination of sedi-ments of southern Lake Michigan, and factors affecting t-DDT distribution and DDT degradation are discussed. Sediments were collected with a Shipek grab or a Benthos gravity corer. Tempera-ture, pH, AND ELECTRODE POTENTIAL WERE DETERMINED IMMEDIATELY. Samples which were frozen until analysis, were thawed, drained of excess water, and subsampled for particle-size and insecticide determinations. A aining portion was air-dried and used for total and inorganic carbon determinations. Samples were extracted with acetone, cleaned up by passage through a Fluorisil column, and analyzed for chlorinated hydrocarbon insecticides using a Varian Aerograph 204 with an Ni-63 electron-capture detector and glass column containing 1.95 per-cent QF-1 and 1.5 percent OV-17 on Supelcoport 100-120 mesh Chromosorb at 195 C. The pesticides identified were DDT, DDD, DDE, dieldrin, and traces of lindane and heptachlor epoxide. Statistical analysis showed high positive correlations between t-DDT (DDT, DDE, DDD) and dieldrin concentrations in the sample and organic carbon content. The amount of organic carbon in surficial sediments was directly proportional to the clay-size fraction of sediment. Dechlorination of DDT to form DDD apparently predominates under the reducing conditions of sediments on the eastern side of the south basin of Lake Michigan. In other areas, DDT is the principal component of the t-DDT complex in sediments and DDE and DDD are major degradative products. (Little-Battelle) W74-01397

LIGAND PHOTOOXIDATION IN COPPER (II) COMPLEXES OF NITRILOTRIACETIC ACID. IMPLICATIONS FOR NATURAL WATERS, Carleton Univ., Ottawa (Ontario). Dept. of

Chemistry. C. H. Langford, M. Wingham, and V. S. Sastri. Environmental Science and Technology, Vol 7, No 9, p 820-822, September 1973. 3 fig, 14 ref.

Descriptors: *Aqueous solutions, *Copper, *Nitrilotriacetic acid, Path of pollutants, Heavy metals, Carbon dioxide, Irradiation, Spectrophotometry.
Identifiers: *Fate of pollutants, *Photodecomposi-

tion, Iminodiacetic acid, Formaldehyde, layer chromatography, Actinometry.

Solutions of Cu-NTA complex were prepared from stock solutions of Cu (II) and H3NTA and irradiated in a Rayonet photoreactor for 100 minutes to study their photodecomposition. Despite low absorptivity of the complexes, significant decomposition occurred with the production of formal-dehyde, iminodiacetic acid, and carbon dioxide (by inference). The quantity of photodecomposition was estimated by spectrophotometric deter-mination of the formaldehyde produced. Iminodiacetic acid was determined by thin-layer chromatography. The quantum yield, as deter-mined by ferrioxalate actinometry decreases linearly with increasing pH over the range of 2-12.

The efficiency of photodecomposition decreases with increasing concentration above 0.001 M but approaches a limiting value below about 0.0005 M. The low concentration limit of the efficiency of decomposition is approximately 1.0. There is no direct evidence for the intervention of Cu (I) species although a photoredox pathway involving Cu seems the most plausible mechanism. (Little-Bat-W74-01400

PATHWAYS OF TRACE ELEMENTS IN ARC-TIC LAKE ECOSYSTEMS,

Alaska Univ., College. Inst. of Marine Science. R. J. Barsdate.

Available from NTIS Springfield, Va., 22151, as RLO-2229-T2-1 for \$3.00 paper copy \$1.45 microfiche. Progress Report No. RLO-2229-T2-1, 1972. 87 p. 19 fig, 15 tab, 57 ref. Contract No. AT (45-1)-2229 No. 2.

Descriptors: *Trace elements, *Phytoplankton, Tundra, Ponds, Lakes, Ecosystems, *Path of pollutants, *Water pollution effects, Humic acids, Phytotoxicity, Heavy metals, Lake sediments, Pollutant identification, Biomass, Primary productivity, Bioassay, Alkaline earth metals, analysis, Chemical analysis, Cycling nutrients, Plant tissues, Zinc, Lead, *Alaska, Aquatic algae, Food webs, Food chains, Copper, Silica, Chrysophyta, Cobalt, Manganese, Chlorophyta, Pyrrophyta, Cyanophyta, Calcium, Magnesium, Strontium, Surface waters, Eutrophication, Methodology, Electrochemistry, Sediments, Dinoflagellates, Color, Diatoms, Euglenophyta, Laboratory tests, Absorption, Lagoons, Standing

crops, Limiting factors.
Identifiers: *Metals complexes, Natural organics,
Chemical composition, Phosphorus cycle, Bioaccumulation, Fate of pollutants, Dissolved carbon, Dissolved nitrogen, Dissolved copper, Dissolved silica, Rhodomonas minuta, Dissolved organic carbon, Zostera marinus, Sensitivity.

The primary emphasis of this report is the interac-tions between planktonic algae and trace metals (principally zinc) in solution as related to lake ecosystems in the Arctic. Distinctions were made, where possible, between pathways and effects of metals in simple ionic forms and those bound to naturally occurring organic ligands. The results from studies of tundra pond waters indicate that increases in metal concentrations may be responsible for the absence of fall phytoplankton blooms and a dramatic shift in phytoplankton population from Rhodomonas minuta to Chrysophyta. In lakes with high natural concentrations of humic complexing agents there was a pronounced sup-pression of phytoplankton production by the addition of trace metals. This suggested that such com-plexed metals are available physiologically to phytoplankton. The shallow marine or estuarine lagoons bordering the Bering Sea have vast eelgrass meadows which are responsible for exporting substantial quantities of dissolved C, N, P, Cu, and silica; Pb is also removed but in smaller quantities. The somewhat detailed study of zinc showed that in organic-rich lakes, a large fraction of the total Zn is in the form of dissolved complexes or colloidal complexes, and a smaller frac-tion is in simple inorganic forms. Precision in the determination of complexed zinc is considered to be extremely important. (Holoman-Battelle) W74-01401

LEAVES AS SOURCE OF PHOSPHORUS, Wisconsin Univ., Madison. Water Chemistry Pro-

gram. W. F. Cowen, and G. F. Lee.

Environmental Science and Technology, Vol 7, No 9, p 853-854, September 1973. 3 tab, 6 ref.

Descriptors: *Leaves, *Water pollution sources, *Phosphorus, *Oak trees, Model studies, *Urban runoff, Nutrients, Leaching, Sampling,

Group 5B-Sources of Pollution

Colorimetry, Pollutant identification, Color reactions, Methodology.

Identifiers: *Poplar trees, Sample preparation, Soluble phosphorus.

Oak and poplar leaves were leached with distilled Oak and popular leaves were reached while disabled water in laboratory columns to simulate the release of soluble phosphorus (P) forms to urban runoff. Most of the soluble phosphorus leached was reactive in a molybdenum blue analysis. The leaves tested yielded 54-230 micrograms P/g of leaves. Consecutive leachings of an oak leaf sample yielded soluble P in amounts related to the effective soaking period between leachings and to the number of proceding leachings. Cut up leaves released almost three times as much soluble P as intact leaves. Leaves collected from the littoral zone of Lake Mendota leached less P than control leaves collected on the shore nearby. The moisture retained on leaves after a rainstorm contained sig-nificant soluble reactive P. The results point to the importance of proper leaf pickup and control in order to minimize the phosphorus content of urban drainage during the fall of the year. (Holoman-Bat-W74-01407

RELATION BETWEEN TOTAL BODY WEIGHT AND CONCENTRATIONS OF MANGANESE, IRON, COPPER, ZINC, AND MERCURY IN WHITE MUSCLE OF BLUEFISH (POMATOMUS SALTATRIX) AND A BATHYL--DIMERSAL FISH ANTIMORA ROSTRATA, National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.

F. A. Cross, L. H. Hardy, N. Y. Jones, and R. T. Barber.

Darroal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1287-1291, September 1973. 1 fig, 2 tab, 19 ref.

Descriptors: *Size, *Weight, *Heavy metals, Iron, Copper, Zinc, Mercury, Chemical analysis, Pollutant identification, Marine fish, Deep-water

habitats, Demersal fish, Trace elements.

Identifiers: *Muscle, Bioaccumulation, *Bluefish, *Morids, Chemical concentration, Animal tissues, Pomatomus saltatrix, Antimora rostrata.

The purpose was to compare the relation between total body weight and concentrations of Hg with that of four biologically-essential transition metals (Mn, Fe, Cu, and Zn) in white muscle of two species of marine fish that inhabit different environments in the Atlantic Ocean. These species were bluefish (Pomatomus saltatrix), an epipelagic carnivore found in coastal waters of the western Atlantic Ocean, and a bathyl-demersal morid Antimora rostrata collected from 2500-m depth. The mercury concentrations increased significantly with size (P less than 0.001) in both species of fish but concentrations of Mn, Fe, Cu, and Zn either remained constant or decreased. These results indicated that fish residing in two different ecosystems in the Atlantic Ocean may be in a steady state with their environment with respect to Mn, Fe, Cu, and Zn but not Hg. The observed variations in accumulation patterns of trace metals in muscle of these two species as a function of size are discussed. (Holoman-Battelle) W74-01413

DETERMINATION OF MELEIC HYDRAZIDE RESIDUES IN TOBACCO AND VEGETABLES, Department of Agriculture, Ottawa (Ontario). Chemistry and Biology Research Inst. For primary bibliographic entry see Field 05A. W74-01418

SALINITY ADAPTATION BY DUNALIELLA TERTIOLECTA. I. INCREASES IN CARBONIC ANHYDRASE ACTIVITY AND EVIDENCE FOR A LIGHT-DEPENDENT NA (PLUS)/H (PLUS) EXCHANGE, State Univ. Coll., Geneseo, N.Y. Dept. of Biology.

For primary bibliographic entry see Field 05C. W74-01427

DIATOM ASSOCIATIONS IN YAQUINA ESTUARY, OREGON: A MULTIVARIATE

Oregon State Univ., Corvallis. Dept. of Botany. C. D. McIntire.

Journal of Phycology, Vol 9, No 3, p 254-259, September 1973. 2 fig, 5 tab, 13 ref.

Descriptors: *Diatoms, *Bioindicators, Distribution patterns, *Oregon, Statistical methods, Sampling, Salinity, Seasonal.

Identifiers: Data interpretation, *Yaquina Estuary (Ore.), *Cluster analysis, Principal components analysis, Species diversity, *Multivariate analysis.

In August 1968 and February 1969, 15,445 diatom cells were collected from several sites in the Yaquina Estuary, identified and counted, and the data subjected to cluster analysis and principal components analysis. The purpose of the analysis was to examine the degree to which the diatom flora can be partitioned into discrete associations and to relate their composition to selected physical properties of the estuary. Samples were collected with PVC sampling devices attached to pilings. The results show that the species composition of the diatom flora during the winter was more close-ly associated with salinity and intertidal exposure than in the summer. A cluster of freshwater taxa obtained for the winter data was the most conspicuous diatom association defined by the cluster analysis. Although taxa within a cluster had more similar distributions than taxa from different clusters, there was considerable variation in the distributions of marine and brackish water taxa within a multispecies cluster. (Little-Battelle)

KINETICS OF SILICON-LIMITED GROWTH IN THE MARINE DIATOM THALASSIOSIRA PSEUDONANA HASLE AND HEIMDAL (EQUALS CYCLOTELLA NANA HUSTEDT), Woods Hole Oceanographic Institution, Mass. For primary bibliographic entry see Field 05C.

SUPERSATURATION OF NITROGEN PASSAGE THROUGH TURBINES AT MAC-WATER DURING HYDROELECTRIC TAQUAC DAM,

Environmental Protection Service. Halifax (Nova Scotia). For primary bibliographic entry see Field 05C. W74-01432

PROBABLE CAUSES FOR THE 1972 RED TIDE IN THE CAPE ANN REGION OF THE GULF OF

New Hampshire Univ., Durham. Dept. of Botany. For primary bibliographic entry see Field 05C.

COUPLING CARBON FLOW THROUGH SOME PELAGIC AND BENTHIC COMMUNITIES Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.

B. T. Hargrave Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1317-1326, September 1973. 3 fig, 3 tab, 48 ref.

Descriptors: *Primary productivity, *Oxygen demand, *Sediments, *Carbon, *Photosynthesis, *Regression analysis, Data processing, Correla-Identifiers: Organic carbon.

Undisturbed sediment cores (10-15 cm long) were taken with 300-500 ml overlying water using a Kajak corer for measurement of oxygen uptake

and organic carbon to attempt to relate to two values. Multiple linear regression was used to evalnate the effects of total water column denth. mixed-layer depth, temperature at sediment surface, and carbon supply (primary production) on oxygen uptake by sediment cores from various lakes, bays, and coastal areas for which mean annual estimates are available. Sediment core oxygen uptake was found to be correlated positively with primary production and inversely with mixed-layer depth in various aquatic ecosystems for which the input of organic matter is predominantly autochthonous. In these areas organic carbon sedimentation is proportional to the ratio of carbon input: mixed-layer depth which reflects increased mineralization with increased depth of mixing. The ratio of primary production: mixed-layer depth is compared with the carbon equivalent of exygen uptake by sediments to derive an expression which used to calculate the amount of photosynthetically fixed carbon respired at the sediment surface. (Little-Battelle) W74-01437

SAND BEACH BACTERIA: ENUMERATION

AND CHARACTERIZATION, American Univ., Beirut (Lebanon). Dept. of Biolo-

For primary bibliographic entry see Field 05A. W74-01444

MURFEE V. PHILLIPS PETROLEUM COM-PANY (ACTION BY PROPERTY OWNERS AGAINST OIL AND GAS LESSEES FOR DIMINUTION OF MARKET VALUE OF LAND DUE TO POLLUTION OF UNDERGROUND FRESH WATER SUPPLY).

For primary bibliographic entry see Field 06E. W74-01459

DRINKING WATER, For primary bibliographic entry see Field 05F. W74-01466

PHYTOPLANKTON NUTRIENTS AND FLUSH-ING OF INLETS ON THE COAST OF NOVA

Bedford Inst., Datrmouth (Nova Scotia). Marine Ecology Lab.

T. Platt, A. Prakash, and B. Irwin. Nat Can (Que). Vol 99, No 4, p 253-261. 1972. Illus. Identifiers: *Canada (Nova Scotia coast), Coasts, *Flushing, Inlets, *Nutrients, *Phytoplankton.

In 2 inlets 35 km apart on the Atlantic coast of Nova Scotia, Canada, fluctuations of phytoplankton nutrients during 1967 were strikingly similar. It is concluded that, except during the spring bloom, nutrient levels in the inlets on this coast are controlled more by water movements on the continental shelf than by biological processes within the in-lets. Flushing of the inlets is more extensive in late summer and autumn. Water replacement occurs every year on this coast and the flushing takes place on a broad front rather than affecting isoated inlets .-- Copyright (c) 1973, Biological Abstracts. Inc. W74-01471

APPLICATION OF MATHEMATICAL MODELLING TO WATER QUALITY MANAGE-

MENT, EASAMS, Camberley (England). J. G. Mellor, and N. C. Oxley. Effluent and Water Treatment Journal, Vol 13, No

8, p 47-479, August 1973. 2 fig, 4 tab, 2 ref.

Descriptors: *Water quality, *Monitoring, *Management, River systems, *Pollution abatement, *Mathematical models, Systems analysis, Decision making, Biochemical oxygen demand, Dissolved oxygen, Water resources.

Sources of Pollution—Group 5B

Identifiers: *River Itchen (Hampshire-England), *Ammoniacal nitrogen decay.

A quality model is the framework upon which more comprehensive mathematical models of water quality control systems can be developed where the economics of alternative water quality improvement measures are considered. It is essential that all water quality management decisions be based on an accurate description of the quality system itself, and the river basin must be treated as one interrelated system. Needed is a precise, descriptive, predictive model for monitoring river water quality, enabling quick and rational water quality decisions; the model should be based on existing information and consider all constituents (not only DO and BOD) which may have undesirable or toxic effects at even very low levels of concentration. Recognizing the uniqueness of cause and effect relationships in any system, the model can be developed at a simple level incorporating those processes directly affecting water quality. Such a model can be developed from the statistical treatment of water quality data collected on a routine basis by any river authority. This technique is described in its application to the state of am-moniacal nitrogen in the River Itchen in Hampshire, England. (Bell-Cornell) W74-01486

THERMAL AND BASE-CATALYZED HYDROL-YSIS PRODUCTS OF THE SYSTEMIC FUNGI-

California Univ., Davis. Dept. of Environmental Toxicology. E. R. White, E. A. Bose, J. M. Ogawa, B. T. Manji,

and W. W. Kilgore.

Journal of Agricultural and Food Chemistry, Vol 21, No 4, p 616-618, July/August 1973. 4 fig, 7 ref.

Descriptors: *Hydrolysis, *Chemical degradation, *Spectroscopy, Carbamate pesticides, Pollutant identification, Synthesis, Methodology, Solubili-ty, Fungicides, Chemical reactions, Isolation, Pol-

Identifiers: *Degradation products, *Benomyl, Methyl 2-benzimidazole carbamate. *Spectral analysis, 1 2 3 4-Tetrahydro-3-butyl-2 4-dioxo-sanaysas, 1 2 4-1ettanyuro-3-outyr 2-4-utovo-triazino (a)benzimidazole, 1- (2-Benzimidazolyl)-3-n-butyl urea, Fate of pollutants, Chemical struc-ture, Thin layer chromatography, Methyl 1- (butyl-carbamoyl)-2-benzimidazole carbamate, Infrared spectra, Infrared spectrophotometry, MBC, NMR spectra, Mass spectra, STB, BBU, Characteriza-

The chemical fate of benomyl (methyl 1- (butylcarbamovl)-2-benzimidazolecarbamate) fungicide in practical use situations was investigated. Conversion products were isolate, purified, and sub-sequently subjected to a number of spectroscopic techniques appropriate for structural characterization. Synthesis routes for obtaining otherwise unavailable reference standards of hydrolysis products are described and a degradative pathway of benomyl to these conversion products is proposed. (Holoman-Battelle) proposed. (W74-01504

ALGAL EXCRETION OF C-14-LABELED COM-POUNDS AND MICROBIAL INTERACTIONS IN CYANIDIUM CALDARIUM MATS, Wisconsin Univ., Madison. Dept. of Bacteriology.

For primary bibliographic entry see Field 05C.

MECHANISM OF NTA DEGRADATION BY A BACTERIAL MUTANT, Department of the Environment, Burlington (On-

P. T. S. Wong, D. Liu, and D. J. McGirr.
Water Research, Vol 7, No 9, p 1367-1374, September 1973. 3 fig. 2 tab, 22 ref.

Descriptors: *Nitrilotriacetic acid, *Microbial degradation, *Kinetics, Bacteria, Cultures, Bioassay, Radioactivity techniques, Absorption. Identifiers: *Transport, *Metabolites, *Bioaccumulation, Scintillation counting, Sample preparation, Exchange diffusion, Glycine, Acetic acid.

A bacterial mutant which was found previously to degrade NTA was used to investigate the mechanism and conditions of NTA degradation. Energy requirements for NTA transport were investigated by measuring the rate and level of up-take of C-14-labeled NTA by untreated bacteria and bacteria treated with sodium azide or potassium cyanide to abolish energy production in the cells. The results suggest that energy is involved in NTA transport and the bacteria can concentrate NTA from environments in which it may be otherwise too dilute for growth. An attempt was made to identify metabolic products of NTA degradation by exchange diffusion which involved lab cells with C-14 NTA; exposing them to unlabeled NTA, IDA, succinate, citrate, glycine, and acetate; and measuring the change in C-14 NTA content of the cells. The results suggest that glycine and acetate may be intermediates of NTA degradation, and the other compounds are either transient intermediates or not produced. The mu-tant was able to degrade NTA from an initial concentration of 290,000 micrograms/1 to less than 50 micrograms/1 in 45 min, representing a degrada tion rate of 486 micrograms/hour/mg dry weight of cells. This result was substantiated by kinetic studies which gave a Km of 82 micrograms/1 and a V max of 370 micrograms/hour/mg dry weight cells. Maximal degradation occurred at 50 C. The ability of the mutant to metabolize NTA resides ainly in the cell membrane fraction. (Little-Battelle) W74-01515

SR-87/SR-86 RATIOS AND TOTAL STRONTI-UM CONCENTRATIONS IN SURFACE WATERS OF THE SCIOTO RIVER DRAINAGE BASIN, OHIO.

Miami Univ., Oxford, Ohio. Dept. of Geology. J. B. Curtis, Jr., and A. M. Stueber. The Ohio Journal of Science, Vol 73, No 3, p 166-175, May 1973. 4 fig, 2 tab, 12 ref.

Descriptors: *Water *Strontium. analysis, *Tracers, *Monitoring, Mass spectrometry, Water *Tracers, *Monto-map
pollution sources, Samplin
Radioisotopes, Sampling, Separation Strontium radioisotopes, *Ohio.

Identifiers: *Scioto River (Ohio), Sr-86, Sr-87, Background levels, Atomic absorption sp trophotometry, Ion exchange chromatography.

Water samples were collected from 16 locations on the Scioto River to determine whether variations exist in Sr-87/Sr-86 ratios, to evaluate the effects of rock types on the ratios, and to evaluate the effect of input from tributaries on isotopic composition. Samples were collected from the Scioto River above and below tributary confluences and from tributaries above their confluence with the Scioto. Polyethylene containers were used to store the samples until determination of Sr by atomic absorption spectrophotometry. Sr was separated from water by cation-exchange chromatography, and isotopic compositions were determined on a solid-source mass spectrometer. Total Sr concentrations were quite variable and, in the northern portion of the basin, they were unusually high compared to most North American rivers, probably due to to weathering of celestite in the Silurian carbonate bedrock and overlying glacial till. The Sr-87/Sr-86 ratios of the Scioto River throughout its length are constant at about 0.7084, whereas tributaries have a range of values from about 0.708 to about 0.715. The effect of bedrock on the strontium-isotopic compositions of these waters is apparently superseded by the effect of readily soluble carbonate and celestite in the glacial till. Based on this survey, application of the

Sr-87/Sr-86 ratio as a tracer of surface-water provenance in Ohio should be restricted to unglaciated terrain. (Little-Battelle)

BENTHIC MACROINVERTEBRATES AS IN-DEXES OF WATER QUALITY IN WHETSTONE CREEK, MORROW COUNTY, OHIO (SCIOTO

RIVER BASIN), Akron Univ., Ohio.

J. H. Olive, and C. A. Dambach.
The Ohio Journal of Science, Vol 73, No 3, p 129-149, May 1973. 4 fig, 1 tab, 58 ref.

Descriptors: *Benthic fauna, *Bioindicators, *Water quality, *Systematics, Animal groupings, Water pollution, Water pollution sources, Crustaceans, Waste water (Pollution), Aquatic insects, Water properties, Biological properties, Bottom sampling, Water analysis, Annelids, Mollusks, *Ohio, Invertebrates, Brines, Storm runoff, Domestic wastes, Sewage effluents, Sewage treat-ment, Treatment facilities, Septic tanks, Water

Identifiers: *Macroinvertebrates. Creek (Ohio), Species diversity index, Species diversity, Community-ordination technique, Flatworms, Shannon-Wiener diversity index, Leeches, Chironomids, Sampling techniques, Tur-bellaria, Scuds, Black flies, Bugs, Pelecypoda, Pouch snails, Alderflies, Water boatmen, Small water striders, Predaceous diving beetles, Whirling beetles, Crawling water beetles, Water scavenger beetles, Anthomyiid flies, Long-legged flies, Dance flies, Shore flies, Biting midges, Flower flies, Horse flies.

During the summer of 1966, Whetstone Creek, a tributary of the Olentangy River in central Ohio, received (1) domestic wastes from a secondary sewage-treatment plant at Mt. Gilead, (2) septictank drainage near Cardington, (3) brines from field operations between Mt. Gilead and Cardington, and (4) stormwater runoff from agricultural lands. Dissolved-oxygen levels as low as 4.3 ppm and total-phosphate concentrations as high as 4.2 ppm were noted 1 km below Mt. Gilead. Chlorides ranging from 105-276 ppm were recorded in the stream between Mt. Gilead and the Delaware Reservoir. Seventy-nine taxa of benthic macroinvertebrates were collected from six sampling locations. The largest variety of organisms (35-39 respectively) was taken from a relatively unpolluted headwater area and from a site 1 km below the Mt. Gilead wastewater-treatment facility. Average Shannon-Wiener diversity indexes exceeded 3.0 at the uppermost sampling station and at two locations 7-15 km below Mt. Gilead. Values less than 2.0 were recorded 9 km above Mt. Gilead and at the lowermost station near the Delaware Reservoir. Low Shannon-Wiener diversity indexes for the latter two areas appear to be related to low diversity of habitat and temporal effects, rather than to poor water quality. Pollution-sensitive and facultative organisms, including certain chironomids, stoneflies, mayflies, caddisflies, and gill-bearing snails, accounted for 98 percent of the benthic organisms collected from upstream stations. Pollution-tolerant tubificids, leeches, certain chironomids, and pulmonate snails increased in abundance and percentage composition at all stations below Mt. Gilead, accounting for as much as 50-60 percent of the benthic community at the lowermost station. (Holoman-Battelle)

SOME EFFECTS OF FILTRATION ON THE DETERMINATION OF NUTRIENTS IN FRESH AND SALT WATER,

National Marine Fisheries Service, Galveston, Tex. Biological Lab. For primary bibliographic entry see Field 07B.

W74-01521

Group 5B-Sources of Pollution

PARTICULATE METALS IN WATERS OF SORFJORD WEST NORWAY,

Edinburgh Univ. (Scotland). Grant Inst. of Geolo-

L. M. Skei, N. B. Price, and S. E. Calvert.

AMBIO, Vol 11, No 4, p 122-124, 1973. 3 fig, 1 tab,
11 ref.

Descriptors: *Distribution patterns, *Path of pollutants, Suspended solids, Dispersion, *Copper, *Lead, *Zinc, *X-ray analysis, Water pollution sources, Water pollution effects, Heavy metals, Industrial wastes, Water analysis, Estuaries, Sea water, Runoff, Separation techniques, Sampling. Identifiers: *Norway (Sorfjord), Background levels, Particulate matter, Sample preparation.

Water samples were collected in PVC/nylon water bottles from various depths at eight stations on the Sorfjord, West Norway, filtered through mem-brane filters, and the Cu, Zn, Pb content of suspended matter determined by x-ray emission analysis. The purpose of the study was to trace the dispersal pattern of metal-containing waste discharged by industrial plants near the town of Odda. The concentrations of the metals in the fjord, especially Zn and Pb, are up to two or three times higher than in natural seawater. Metals have been detected in both surface and subsurface waters 40 km away from the area of metal discharge. Considering the hydrography and the relationship of Zn and Pb in different waters, it seems possible that two distinct bodies of contaminated water outflow from the fjord. However, during periods of high river runoff, the dispersal of metals in subsurface waters will be different, and it is predicted that at such times pollution of the inner fjord will be greatest. (Little-Battelle) W74-01528

DISTRIBUTION OF (C-14) PCBS IN CARP, Tokyo Univ. of Fisheries (Japan). For primary bibliographic entry see Field 05C. W74-01530

BOTTOM FAUNA AS AN INDICATOR OF WATER QUALITY IN SWEDEN'S LARGE LAKES (LAKES MALAREN, VATTERN AND VANERN),

Uppsala Univ. (Sweden). Inst. of Zoology.

T. Wiederholm.

AMBIO, Vol 11, No 4, p 107-110, 1973. 2 fig, 1 tab, 10 ref.

Descriptors: *Benthic fauna, *Bioindicators, *Midges, *Trophic level, Invertebrates, Tubificids, Aquatic insects, Larvae, Lakes, Aquatic animals, Water pollution, Diptera, Annelids, Oligochaetes, Oligotrophy, Eutrophication, Larval growth stage.

Identifiers: Lake Malaren, Lake Vattern, Lake Vanern, *Sweden, Sensitivity, Chironomids, Microspectra spp, Heterotrissocladius subpilosus, Stictochironomus rosenscholdii, Sergentia coracina, Chironomus anthracinus, Chironomus plumosus, Procladius spp, Chaoborus flavicans, Macroinvertebrates.

During recent years, comprehensive chemical and biological investigations of the large lakes of Sweden have been conducted. The studies were initiated in 1964 as a consequence of the alarming deterioration of the water quality in Lake Malaren. The biological section of the Lake Malaren Research project, later renamed the Limnological Survey of the National Swedish Environment Protection Board (NLU), has undertaken studies of phytoplankton, primary production, zooplankton, bottom fauna, macrophytes and fish. The composition of the bottom fauna has proved to give valuable information about the water quality. The use of certain midge larvae as indicator organisms is demonstrated with examples from the lakes mentioned above. It is concluded that comprehensive information on the trophic state and the

degree of pollution in a water may be obtained through analysis of a few, ecologically significant species. (Holoman-Battelle) W74-01531

DEGRADATIVE VERSATILITY OF CORYNEBACTERIUM PSEU-DODIPHTHERITICUM NCIB 10803 WHICH USES AMIDES AS CARBON SOURCE, Nottingham Univ. (England). Dept. of Pharmacy. D. J. W. Grant.

Antonie van Leeuwenhoek, Vol 39, No 2, p 273-279, 1973. 1 tab, 12 ref.

Descriptors: *Microbial degradation, *Organic compounds, *Aerobic conditions, Metabolism, Amino acids, Carbohydrates, Biodegration, Ureas, Cellulose, Hexadecanol, Phenols, Aromatic compounds, Organic acids, Biological properties, Aerobic bacteria. Identifiers: *Corynebacterium pseudodiphtheriticum, *Bacterial physiology, *Amides, *Carbon sources, Substrate utilization, Aromatic hydrocarbons, Organonitrogen compounds, Fate of pollutants, Biochemical characteristics, Nitriles, Fatty acids, Paraffins, alpha omega-Alkandioic acids, Benzenoid compounds, Nutrient sources, Aliphatic hydrocarbons, Culture media, Polysaccharides, Disaccharides, Monosaccharides, Heterotrophic bacteria, Catechol, Alanine, Arginine, Asparagine, Gluta-

mates, Glutamine, Histidine, Leucine.

Corynebacterium pseudodiphtheriticum NCIB 10803 was tested for aerobic growth with a large number of C sources in mineral salts medium with NH4 (plus) as N source. Growth was supported by some amino acids, some sugars, compounds of the Krebs' cycle, the higher normal paraffins, normal aliphatic alchols, fatty acids, the amides and nitriles of fatty acids, alpha omega-alkandioic acids and some simple benzenoid compounds. Possible metabolic pathways are discussed. Degradation of catechol proceeded by ortho-fission via cis-cis-muconate. (Holoman-Battelle) W74-01536

INHIBITION BY FATTY ACIDS OF THE BIODEGRADATION OF PETROLEUM, Rutgers - The State Univ., New Brunswick, N.J. Dept. of Biochemistry and Microbiology. R. M. Atlas, and R. Bartha.

Antonie van Leeuwenhoek, Vol 39, No 2, p 257-271, 1973. 9 fig, 3 tab, 13 ref.

Descriptors: *Microbial degradation, *Inhibition, Effects, Cultures, Pollutant identification, Dialysis, Biodegradation, Oil, Marine bacteria, Organic acids, Gas chromatography, Isolation, Metabolism, Organic compounds.

Identifiers: *Brevibacterium, *Flavobacterium, Mineralization, *Crude oil, Synergistic effects, Fatty acids, Petroleum hydrocarbons, Substrate utilization, Metabolites, Caprylic acid, Lauric acid, Myristic acid, Palmitic acid, Stearic acid, Degradation products, Flame ionization gas chromatography, Gas liquid chromatography, Sweden crude oil, Oxygen consumption, Octanoic acid, Dodecanoic acid, Tetradecanoic acid, Hexadecanoic acid, Octadecanoic acid, n-Paraffins, Thin layer chromatography, Fate of pollutants.

The accumulation of toxic intermediary metabolites, possibly fatty acids, has been investigated as the probable cause for the cessation of the biodegradation of crude oil over a period of time. Dialysis cultures of Brevibacterium and Flavobacterium which contained Sweden crude oil were used in the study. The residual oil was extracted at the end of each experiment and its amount determined by gas chromatography. Artificial seawater media plus Sweden crude oil or a simplified model petroleum were inoculated with one of the bacteria and the cultures incubated for 8 days at 28 C on a rotary shaker at 200 rev/min. Ex-

tracts of the media were analyzed by thin-layer and flame ionization gas-liquid chromatography to determine the fatty acid metabolites. Biodegradation and mineralization of crude oil in the presence of fatty acids were measured. The extent of biodegradation of petroleum by the two marine bacterial isolates was found to increase when the organisms were grown in dialysis culture. This suggests that inhibitory products are formed during growth on petroleum. Fatty acids were produced by both organisms and were present in the dialyzate (dialyzable material). Fatty acids and crude oil were found to have a synergistic toxic effect. Short-chain acids were more toxic than longer-chain ones. (Holoman-Battelle)

INVESTIGATIONS ON THE SHEATHED BACTERIUM HALISCOMENOBACTER HYDROSSIS GEN.N., SP.N., ISOLATED FROM ACTIVATED SLUDGE,

Agricultural Univ., Wageningen (Netherlands).

Lab. of Microbiology.
W. L. Van Veen, D. Van Der Kooij, E. C. W. A.
Geuze, and A. W. Van Der Vlies.

Antonie van Leeuwenkoek, Vol 39, No 2, p 207-216, 1973. 8 fig, 16 ref.

Descriptors: *Activated sludge, *Isolation, *Pollutant identification, *Sewage bacteria, Cytological studies, Biological properties, Nutrient requirements, Methodology, Speciation, Cultures, Aquatic habitats, Systematics.

Identifiers: *Haliscomenobacter hydrossis, Cul-

Identifiers: *Haliscomenobacter hydrossis, Culture media, Biochemical characteristes, Bacterial physiology, Cell morphology, Sewage microorganisms. Selective media.

The morphological and physiological properties are described of a recently isolated, thin, sheathed bacterium. The observations demonstrate that this bacterium differs from the known sheathed microorganisms in many characteristics. The following nomenclature is therefore proposed: Haliscomenobacter hydrossis gen.n. sp.n. The growth of this bacterium in activated sludge is discussed. (Holoman-Battelle)
W74-01539

BACTERIOLOGY OF ACTIVATED SLUDGE, IN PARTICULAR THE FILAMENTOUS BACTERIA

Agricultural Univ., Wageningen (Netherlands). Lab. of Microbiology. W. L. Van Veen.

Antonie van Leeuwenhoek, Vol 39, No 2, p 189-205, 1973. 22 fig, 36 ref.

Descriptors: *Activated sludge, *Isolation, Pollutant identification, *Sewage bacteria, *Cytological studies, Aquatic bacteria, Microbiology, Electron microscopy, Cultures, Methodology, Aquatic microorganisms, Aerobic bacteria.

Identifiers: *Cell morphology, *Bacterial physiology, *Filamentous bacteria, Culture media, Sewage microorganisms, Sphaerotilus natans, Sphaerotilus discophorus, Streptothrix hyalina, Flavobacterium, Gram-negative bacteria, Phase contrast microscopy, Flexibacter, Microscilla, Gram-positive bacteria.

Microscopic examination of bulking activated sludge samples showed the presence of a variety of filamentous microorganisms, some of which have not yet been described in the literature. A method was developed to obtain pure cultures of these threaded bacteria. To date, five clearly different groups of filamentous bacteria may be distinguished by the determination of a few morphological and physiological characteristics of the isolates. A variety of sheathed bacteria are included in Group I. Group II includes non-motile, gram-negative, orange- or yellow-pigmented filamentous bacteria. These microorganisms are thought to be related to some species of the genus

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Sources of Pollution-Group 5B

Plavobacterium. The gram-negative, threaded bacteria of Group III show a more or less distinct gliding movement and form red colonies on rich agar media. These bacteria may apparently be related to species described in the genera Microscilla and Flexibacter. The filamentous bacteria of Group IV structually resembled some Cyanophyceae, but do not contain photosynthetic pigments. They are gram-positive and non-motile. A number of unk-nown, non-motile bacteria which stain gram-positive with a variable number of gram-negative autolyzed cells in the filaments, are assigned to Group V. The properties of the isolated bacteria are described briefly and their occurrence in bulking activated sludge is discussed. (Holoman-Bat-W74-01540

ISOTOPE FRACTIONATION OF N-15 AND N-14 IN MICROBIOLOGICAL NITROGEN TRANS-FORMATIONS: A THEORETICAL MODEL. California Univ., Riverside.

D. D. Focht. Journal of Environmental Quality, Vol 2, No 2, p 247-252, April-June, 1973. 2 fig, 1 tab, 29 ref.

Descriptors: *Nitrogen, *Model studies, *Isotope fractionation, *Microbial degradation, Ammonification, Nitrification, Microorganisms, Metabolism, Kinetics, Nutrients, Chemical reactions, Regression analysis, Theoretical analysis,

Identifiers: *Biotransformation, N-14, N-15, Fate of pollutants, Data interpretation, Isotope dis-crimination, Isotope effect, Nitrogen Isotope radioisotopes, Enrichment, Substrate utilization.

The kinetics for first-order multisequence reac tions are derived for microbial fractionation of N-14 and N-15 isotopes. The isotope effect accounts for unreacted substrate becoming progressively enriched in the heavier isotope due to preferential utilization of the lighter isotope by microorganisms. Consequently, during denitrification nitrate becomes enriched in N-15 as its concentration diminishes. This inverse proportional relationship is expressed as a hyperbolic function, y equals ax to the minus b power. Similar curves are derived for nitrate originating from ammonification and/or nitrification. Regression coefficients for a straight line approximation are better than 0.98, but not as good as the actual coefficients for the derived hyperbolic equations. A negative regression 'line' for nitrate occurs for all denitrification reactions during isotope discrimination. Nitrate originating from caesin, ammonium, and nitrate are respec-tively less enriched in N-15 or equal nitrate concentration due to ammonium and nitrate being initially enriched in N-14 during ammonification and nitrification, respectively. (Holoman-Battelle)

RHODOPSEUDOMONAS SULFIDOPHILA, NOV. SPEC., A NEW SPECIES OF THE PUR-PLE NONSULFUR BACTERIA, Groningen Rijksuniversiteit (Netherlands). Dept.

Groningen Kijasalarvostok (A. Horobiology. T. A. Hansen, and H. Veldkamp. Archiv fur Mikrobiologie, Vol 92, No 1, p 45-58, July 10, 1973. 3 fig, 3 tab, 26 ref.

Descriptors: *Photosynthetic bacteria, *Pollutant identification, *Isolation, *Nutrient requirements, *Cytological studies, Pigments, Biological properties, Speciation, Intertidal areas, Mud flats, Anaerobic bacteria, Hydrogen sulfide, Organic compounds, Marine bacteria, Vitamins, Limiting

compounds, marine oscieria, vitamins, Limitug factors, Electron microscopy, Systematics, Identifiers: Biochemical characteristics, *Rhodop-seudomonas sulfidophila, Substrate utilization, Bacterial physiology, Cell morphology, Culture media, Bacteriochlorophyll a, Absorption spectra, Rhodopseudomonas capsulata, Rhodopseudomonas palustris, Chromatium vinosum, Ectothiorhodospira. From marine mud flats a new type of photosynthetic purple bacterium was isolated. This type is described as a new species of the Rhodospirillaceae and is named Rhodopseudomonas sulfidophila. The cells are rod-shaped, 0.6 to 0.9 micron wide and 0.9 to 2.0 microns long, and motile by means of polar flagella. Cell division occurs by binary fission. The photosynthetic membrane system is of the vesicular type. The pigments consist of bacteriochlorophyll a and of carotenoids, most probably of the speroidene group. A wide range of organic compounds can be utilized anaerobically in the light. Growth on organic compounds aerobically in the dark is also possible. Niacin, thiamin, biotin and p-aminobenzoic acid are required as growth factors. The new species needs 2.5 percent (w/v) sodium chloride for optimal growth. All strains show ex-cellent photolithotrophic growth on hydrogen, hydrogen sulfide, and theiosulfate. They show a remarkably high sulfide tolerance. Sulfide and thiosulfate are oxidized to sulfate without an intermediate accumulation of elemental sulfur. The new species seems to be one of the most versatile types of photosynthetic bacteria isolated thus far. (Holoman-Battelle) W74-01544

LITMUS MILK REACTION AS A DISTIN-GUISHING FEATURE BETWEEN STREPTOCOCCUS FAECALIS OF HUMAN AND NON-HUMAN ORIGINS,

Tennessee Univ., Knoxville. Dept. of Microbiolo-

For primary bibliographic entry see Field 05A. W74-01549

2.4-DICHLOROPHENOXYACETATE METABOLISM BY ARTHROBACTER SP.: AC-CUMULATION OF A CHLOROBUTENOLIDE, Cornell Univ., Ithaca, N.Y. Dept. of Agronomy. K. W. Sharpee, J. M. Duxbury, and M. Alexander. Applied Microbiology, Vol 26, No 3, p 445-447, September 1973. 1 fig. 5 ref.

Descriptors: *2 4-D, *Metabolism, *Microbial degradation, *Assay, Enzymes, Herbicides, Chlorinated hydrocarbon pesticides, Cultures, Bacteria, Pollutant identification, Chromatography, Aerobic bacteria.
Identifiers: Fate of pollutants, *Arthrobacter, 2-

Chloro-4-carboxymethylene but-2-enolide, Delactonizing enzymes, Sample preparation, Heterotrophic bacteria, Bioaccumulation, *Chlorobutenolides, Lactonizing enzymes, cis cis-4-Dichloromuconate, Degradation products,

A study was conducted to determine whether cis,cis-2,4-dichloromuconate is an intermediate in 2,4-D metabolism by Arthrobacter sp. Cultures of the microbe were grown at 25C in a 0.2 percent 2,4-D mineral salts medium. The cells were collected by centrifugation and washed three times in a cold buffer, suspended in the buffer containing glass beads and deoxyribonuclease, and disrupted with a sonic oscillator. The preparation was centrifuged at 55,000 g for 1 hr to yield the crude extract. The cis,cis-2,4-dichloromuconate-lactonizing enzyme was assayed by measuring the change in absorbance at 268 nm. This enzyme preparation cis,cis-2,4-dichloromuconate chloromaleylacetate. The enzyme lactonizing the dichloromuconate to yield 2-chloro-4-carbox-ymethylene but-2-enolide was separated from the butenolide-delactonizing enzyme. (Holoman-Bat-W74-01550

BIODEGRADATION OF O-BENZYL-P-CHLOROPHENOL, Monsanto Co., St. Louis, Mo. R. D. Swisher, and W. E. Gledhill. Applied Microbiology, Vol 26, No 3, p 394-398, September 1973, 5 fig. 1 tab, 12 ref. Descriptors: *Biodegradation, *Sewage, tivated sludge, *Bactericides, Microbial degradation, Phenols, Water, Rivers, Colorimetry, Methodology, Phenolic pesticides, Pollutants, Linear alkylate sulfonates, Organic compounds. Identifiers: Natural waters, *Stanophen 1, Carbon dioxide evolution, o-Benzyl-p-chlorophenol, Degradation products, Dissolved organic carbon, Trisodium citrate, Chemical interference.

The extent of biodegradation of o-benzyl-p-chlorophenol, marketed as a germicide under the name Santophen I (Monsanto Co.), in river water, sewage, and activated sludge was determined. Biodegradation was assessed by use of a clorimetric procedure for phenolic materials, carbon analysis, and CO2 evolution. In unacclimated river water, 0.1 mg of Santophen 1 per liter was degraded within 6 days. In sewage 0.5 and 1.0 mg/liter levels of Santophen 1 were degraded in 1 day. Acclimated activated sludge achieve 80 percent biodegradation of 1.0 mg/liter Santophen 1 in 8 h and 100 percent in 24 h. When effluent from a semicontinuous activated sludge unit, acclimated to 20 mg of Santophen 1 per liter was used as the inoculum for the CO2 evolution procedure, 60 per-cent of the total theoretical CO2 was evolved from Santophen 1. Based on the results, indicating santophen I to be readily biodegraded in at least four biological systems, the continued use of present levels of Santophen 1 should present no significant environmental problems. (Holoman-Battelle)

BIODEGRADATION OF PHENYLMERCURIC ACETATE BY MERCURY-RESISTANT BAC-

TERIA, Maryland Univ., College Park. Dept. of Microbiology.

J. D. Nelson, W. Blair, F. E. Brinckman, R. R.

Colwell, and W. P. Iverson. Applied Microbiology, Vol 26, No 3, p 321-326, September 1973. 3 fig, 1 tab, 19 ref.

Descriptors: *Microbial degradation, *Metabolism, Mercury, Isolation, Cultures, *Biodegradation, Heavy metals, Pseudomonas, Estuarine environment, Radioactivity techniques, Fungicides, Metal organic pesticides, Resistance, *Bacteria. Identifiers: *Phenylmercuric acetate, Degradation products, Biotransformation, *Fate of pollutants, Mercury-resistant bacteria, Mercurials (Pesti-cides), Benzene, Selective media, Vibrio, cides), Benzene, Selective media, Vibrio, Arthrobacter, Citrobacter, Enterobacter, Flavobacterium, Organometallics, Slimicides, Flameless atomic absorption spectrophotometry, Vapor phase chromatography, Metabolites.

The metabolism of phenylmercuric acetate (PMA) by selected strains of bacteria was investigated in order to gain an understanding of bacterial mercury resistance, as well as to assess the role of bacteria in transformations of mercury in the natural environment. Mercury-resistant bacteria were isolated from water and sediment on a solid selective medium containing PMA and HgC12. Out of nearly 900 cultures, a group of nine representative cultures was selected and screened for the degradative ability using radioisotope and bioreac-tor experiments. By means of a closed system incorporating a flameless atomic absorption spectrophotometer and a vapor phase chromatograph. it was demonstrated that elemental mercury vapor and benzene were products of phenylmercuric acetate degradation. (Holoman-Battelle) W74-01555

PREDICTION OF THE VARIATION IN THE CHEMISTRY OF A LAKE RESULTING FROM AN INCREASE IN SOLUBLE DEPOSITS: AP-PLICATION: THE SODIUM IN LAKE NEUCHATEL,

trahydrogeologie.
For primary bibliographic entry see Field 02H.
W74-01562

Group 5B-Sources of Pollution

OCCURRENCE AND CUMULATION OF MICROCOMPONENTS IN BOTTOM SEDI-MENTS OF DAM RESERVOIRS OF SOUTHERN POLAND.

Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.

K. Pasternak, and J. Glinski. Acta Hydrobiol, Vol 14, No 3, p 225-255, 1972, Il-

Identifiers: *Bottom sediments, Cumulation, Dams, Micro components, *Poland, Pollution, Reservoirs, *Sediments.

The total amount of microcomponents in sediments depends above all on their grain composi-tion. An exception here are sediments of reservoirs supplied with strongly polluted water. The quantitative differentiation of microcomponents within each granulometric group of sediments, as well as between single samples from various zones of the reservoirs, shows a tendency to a relation-ship with the quantity and quality of clayey and organic matter in the sediment. The presence in the substratum of the catchment basin of the reservoirs of rock layers containing Zn and Pb minerals, or dust coming from the Zn and Pb industries, has some influence on the increase in the amount of these components in the sediments. The main sources of microcomponents in the sediments of pure reservoirs are suspensions brought in by the water of the river, and remains of organisms developing in the reservoirs. The degree of cumulation of microcomponents in the sediments of dam reservoirs is much higher than in land soils and the soils of fish-ponds. Vm accumulates in the sediments in particularly large amounts. The degree of concentration of some microcomponents in the sediments of polluted reservoirs. corresponds in general to the quantity and quality of pollution.—Copyright 1973, Biological Abstracts, Inc. W74-01565

SUBSTANTIATION OF THE MAXIMUM PER-MISSIBLE CONCENTRATION OF ANP-2 COM-POUND IN WATER BODIES, (IN RUSSIAN), Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad (USSR).

For primary bibliographic entry see Field 05G. W74-01581

THERMAL STRATIFICATION IN INDUSTRIAL CANALS, Louisiana State Univ., Baton Rouge For primary bibliographic entry see Field 02E. W74-01594

A CHEMICAL SURVEY OF THE MALACCA RIVER.

Kempas Devon Estate, Malacca (Malaysia). For primary bibliographic entry see Field 02K. W74-01600

A MATHEMATICAL MODEL OF PRIMARY PRODUCTIVITY AND LIMNOLOGICAL PATTERNS IN LAKE MEAD,

Arizona Univ., Tucson. For primary bibliographic entry see Field 05C. W74-01630

RELATIONSHIPS OF INDICATOR AND PATHOGENIC BACTERIA IN STREAM

Detroit Univ., Mich.
R. J. Smith, R. M. Twedt, and L. K. Flanigan. Journal Water Pollution Control Federation, Vol 45, No 8, p 1736-1745, August 1973. 7 fig, 5 tab, 14

Descriptors: *Pathogenic bacteria, *Cultures, Bioindicators, "Salmonella, Density, Water pol-lution effects, Coliforms, Streptococcus, Separa-tion techniques, Seasonal, E. coli, Pollutant identification, Viability. Identifiers: *Fecal coliforms, *Fecal streptococci, *Survival, Culture media, Enrichment, Saline River, Huron River, MPN, Membrane filter,

The Saline and Huron Rivers (Michigan) were bacteriologically examined from August 1969 through July 1970 to determine whether a stable relationship exists between indicator organisms and Salmonella organisms. The analysis determined density relationships of Salmonella, coliform, and streptococcus organisms and survival of Sal-monella in natural environments. Coliforms and fecal streptococci were determined by membrane filter techniques. Salmonellae were determined by MPN techniques using dulcitol selenite en-richment and XLD agar. Survival studies were conducted by suspending cellulose dialysis tubing containing organisms in one of the rivers for four days. Viability was determined daily. Salmonellae were isolated when the fecal coliform concentra-tion was as low as 52/100 ml in the Saline River and 4/100 ml in the Huron. The fecal coliform concentration was greater than 200/100 ml in two-thirds of the samples from the Saline and in onethird of the samples from the Huron that were positive for salmonellae. Samples from both rivers exhibited seasonal trends in the distribution of feal coliform to fecal streptococcus concentration The relationship of Salmonella survival resembled that of fecal coliforms. (Little-Battelle) W74-01645

THE ROLE OF MICRO-ORGANISMS IN WASTE TIP-LAGOON SYSTEMS PURIFYING COKE-OVEN EFFLUENTS,

University Coll. of South Wales and Mon-mouthshire, Cardiff. Dept. of Microbiology. For primary bibliographic entry see Field 05D. W74-01647

5C. Effects of Pollution

BIOCHEMISTRY **ESTUARINE** ECOSYSTEM WITH EMPHASIS ON HEAVY METALS AND SHELLFISH,

Maryland Univ., College Park. Dept. of Chemis-

Available from the National Technical Information Service as PB-225 121/3, \$2.75 in paper copy, \$1.45 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No. 15, March 1973. 7 p, 8 ref. OWRR B-012-MD

Descriptors: Heavy metals, Shellfish, *Oysters, *Sea nettles, *Copper, Water pollution effects, Biochemistry, *Chesapeake Bay, Estuarine en-vironment, Ecosystems, *Enzymes. Identifiers: Glutathione, Proline.

The main purpose was to obtain basic information on the biochemistry of estuarine animals in order to understand the mechanism and effects of heavy metal uptake on these animals. An M.S. thesis has been completed on factors influencing the uptake of copper by oysters under controlled laboratory environments. An abstract of the thesis (The Accumulation of Copper by the American Oyster (Crassostrea virginica) Gmelin, by J. W. Warner, 1972) is included as part of this report. A paper on the effect of glutathione, proline, and shrimp extract on the gastric fluid of the Chesapeake sea nettle has been accepted for publication in Chesapeake Science. A copy of this manuscript (Some Observations on the Effect of Glutathione Proline, and Shrimp Extract on the Gastric Fluid of the Chesapeake Bay Sea Nettle, Chrysaora quinquecirrha (Desor), by B. C. Stewart, S. Lakshnanan, and H. J. Linder (1973)) is included in this report. A Ph.D. thesis is in preparation on the pro-perties of the enzymes of gluconeogenesis in oysters. The results of this part of the work will be reported under the extension of this project.

THE DISTRIBUTION, COMPOSITION AND BIOMASS OF THE CRUSTACEAN ZOOPLANE TON POPULATION IN WESTERN LAKE SU-

PERIOR, Wright State Univ., Dayton, Ohio. Dept. of **Biological Sciences**

J. B. Conway, O. R. Ruschmeyer, T. A. Olson, and

T. O. Odlaug. Available from the National Technical Information Service as PB-225 137/9, \$4.75 in paper copy, \$1.45 in microfiche. University of Minnesota, Min neapolis. Water Resources Research Center, Bulletin 63, August 1973. 157 p, 44 fig, 26 tab, 54 ref. OWRR A-022-MINN (3).

Descriptors: Zooplankton, *Lake Superior, *Productivity, *Biomass, *Crustaceans, Cladocerans, Copepods, Phytoplankton, Lakes, Water pollution effects.

Identifiers: *Alona guttata Sars, *Holopedium gib-berum Zaddach, *Zooplankton patchiness.

Although data were collected for two years, 1970 and 1971, the major portion of this research was carried out the second year. This research took place in western Lake Superior and most of the data were collected at two stations, Larsmont and Stony Point, which were twenty miles northeast of Duluth. The major purposes were to study the productivity and the vertical, seasonal and horizontal distribution of the crustacean zooplankton population in western Lake Superior. A limited study of the biology of the copepod, Limnocalanus macrurus, was also conducted. Productivity differences were found between the various sites and stations. These differences point to the lack of homogeneity in the horizontal distribution of the crustacean zooplankton population and support the phenomenon of 'zooplankton patchiness'. Productivity levels at the Little Marais and Sugar Loaf Cove area were from one-third to two-thirds of those at Larsmont and Stony Point. The Larsmont station was slightly more productive than Stony Point. The Stony Point inshore site was slightly more productive than the offshore site. The period of maximum productivity occurred at the Larsmont inshore site and at both Stony Point sites in September. Maximum productivity was recorded at the Larsmont offshore site in July. (Walton-Minnesota) W74-01109

NUTRIENT SOURCES AND TRANSPORT IN THE UPPER AND CENTRAL REGIONS OF THE BIG SIOUX RIVER.

South Dakota Cooperative Fishery Unit, Brookings. For primary bibliographic entry see Field 05B.

EFFECTS OF PROTOZOA ON THE FATE OF

PARTICULATE CARBON, Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.

H. W. Holm, and F. A. Smith. Copy available from GPO Sup Doc as EP1.23:660-73-007, \$0.70; microfiche from NTIS as PB-225 143/7, \$1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-73-007, August 1973. 36 p, 10 fig, 8 tab, 24 ref. EPA Project 16050 GJC.

Descriptors: *Protozoa, *Aquatic microbiology, *Aquatic bacteria, *Carbon cycle, *Cycling nutrients, Carbon dioxide, Aquatic microorganisms, Food chain, Secondary productivity, Growth rates, Predation. Identifiers: *Carbon transformation, Carbon utilization, Population dynamics, Organic carbon,

Citrobacter, Tetrahymena pyriformis.

Laboratory studies were designed to define the role of protozoa in the fate of particulate (bacteria) organic carbon. Specific objectives were (1) to measure the effects of selected environmental parameters on protozoan growth rates, (2) to mea-

sure organic carbon in bacteria and protozoa, and (3) to quantitate carbon transformations in preda-(5) to quantitate carbon mass of mass of mass of the tor-prey experimental systems. A growth system containing 2 x 10 to the 8th power Citrobacter/ml in 1 x 0.001 M phosphate of pH 7.5, incubated at 25 deg C at a shaking rate of 100 rpm, was found to be an optimal environment for protozoan growth. The nutrient bacterium, Citrobacter, contained 8.6 x 10 to the minus 11th power mg C/cell, and Tetrahymena pyriformis contained 1.1 x 0.000001 mg C/cell. T. pyriformis altered the amount and form of carbon in the system while growing on bacteria. Of the total organic carbon present at the nitiation of the predator-prey experiment (93 mg), 93% was in the bacterial fraction. Within 96 hours, 38% of the carbon was released as CO2; 5% was present as inorganic carbon in the water and the remainder (57%) was present as organic carbon. The organic carbon in the bacterial fraction decreased from 86 to 2 mg within 96 hours, while the carbon in the protozoan biomass increased from 1 to 40 mg. In the bacterial control, 11% of the organic carbon was released as CO2 within 96 hours while negligible amounts of inorganic car-bon remained in the water. (EPA) W74-01117

MATHEMATICAL MODELING OF NUTRIENT

- TRANSPORT, Massachusetts Univ., Amherst. Water Resources

Research Center.
For primary bibliographic entry see Field 05B.

BATRACHOSPERMUM VAGUM AG. IN THE SZCZECIN POMERANIA, A LOCALITY NEW TO POLAND, (IN POLISH), Wyzsza Szkola Rolnicza, Szczecin (Poland).

Katedra Botaniki. For primary bibliographic entry see Field 02H. W74-01219

INVESTIGATIONS ON THE CHANGES IN THE CONTENT OF HEAVY METALS IN LAKE WATERS OF THE MASURIAN LAKE DIS-

Wyzsza Szkola Rolnicza, Olsztyn-Kortowa (Po-land), Instytut Hydrobiologii Ochrany Wodnego. For primary bibliographic entry see Field 05B. W74-01221

ADSORPTION OF COLLOIDAL IRON BY BAC-TERIA.

Queensland Univ., Brisbane (Australia). Dept. of Microbiology.
For primary bibliographic entry see Field 05B.

ZOOBENTHOS OF THE AZOV SEA AFTER THE CONTROL OF THE DON RIVER, (IN RUS-

SIAN), Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR). For primary bibliographic entry see Field 02L. W74-01257

A DISEASED TROUT: MICROBIOLOGICAL STUDY OF ITS PRINCIPAL ORGANS AND ITS

ENVIRONMENT, Lyon Univ. (France). Unite d'Enseignement et de Recherche Sciences Pharm. R. Moreau, and J. Brisou.

Bull Mens Soc Linn Lyon, Vol 40, No 8, p 237-243, 1971.

Identifiers: Aeromonas-liquefaciens, *Bacteria, Citrobacter-freundii, Diseased fish, Em-pedobacter, Environment, Erwinia-cacticida, Er-winia-ichthyosmia, Escherichia-freundii, *France (Haute-Savoie), Innominatus, Microbiological studies, Organs, Phytobacterium, Phytobacterium-fabae, Phytobacterium-liquefaciens, Pseu-domonas-fabae, *Trout (Diseased).

An etiological investigation of an infectious epizootic among rainbow trout at a hatchery in the Haute-Savoie department of France was con-ducted. There was considerable pollution of the culturing pools, attributable to a lack of main-tenance. An infected trout (gyrating motion was symptomatic) was septicemic: Erwinia ichthyosmia was isolated from the blood and heart, B. cacticida from the liver, and Phytobacterium (± Aeromonas) liquefaciens from the gills, blood, heart and intestine. P. (Pseudomonas) fabac was present in all organs examined and Citrobacter (Escherichia) freundii was also present in the blood. The 2 bacteria found in most organs examined (P. fabae and P. liquefaciens) were not found in the pools. P. liquefaciens is especially pathogenic for fish and was probably inespecially pations and was produced into the pools by young fish. The tax-onomic validity of the genera Phytobacterium, Empedobacter, and Innominatus was defended. A number of bacteria were isolated in biotopes dif-ferent from those normally reported for them.— Copyright 1973, Biological Abstracts, Inc. W74-01267

THE BOTTOM MACROFAUNA OF THE OLIGOTROPHIC LAKE KONNEVESI, FIN-LAND,

Jyvaskyla Univ. (Finland). Dept. of Biology.

Jyenska. Ann Zool Fenn. Vol 9, No 3, p 141-146. 1972. Illus. Biomass, *Bottom fauna, Fauna, *Finland (Lake Kon-*Chironomids, Fauna, nevesi), Gammarcanthus-Lacustris, Lakes, Mysis-Relicta, *Oligotrophic lakes, Pallasea-Quadrispinosa, Pisidium-Conventus, Pontoporeia-Affinia

The abundance of the bottom fauna of this lake is lowest around the thermocline and in the greatest depths (>35m). The dominant species of the profundal zone is Pisidium conventus, and larvae of Chironomids dominate in the sublittoral. The abundances of the dominant species, the toal num-bers of individuals and the biomasses were practically the same in the different parts of the lake. The glacial relects Gammaracanthus lacustris, Pallasea quadrispinosa, Pontoporeia affinis, and Mysis relicta are new records for lake Konnevesi. Diversity indices were calculated to compare the different sub-areas. The values of these indices and the factors affecting them are discussed. It is suggested that the low abundances observed for the greatest depths are chiefly due to the low O2 content in winter. It is difficult to classify this lake on the basis of its bottom fauna into any one of the conventional limnological lake types.—Copyright 1973, Biological Abstracts, Inc. W74-01287

EFFECTS OF PARAQUAT ON INVER-TEBRATES IN A CANTEBURY STREAM, NEW ZEALAND,

Ministry of Agriculture and Fisheries, Wellington (New Zealand). Fisheries Research Div.

A. M. R. Burnet. New Zealand Journal of Marine and Freshwater Research, Vol 6, No 4, p 448-455, December 1972. 3 fig, 3 tab, 5 ref.

*Herbicdies, *Invertebrates, Descriptors: Aquatic animals, "Water pollution effects, Aquatic insects, Mollusks, Crustaceans, Pesticides, Halogenated pesticides, Water sampling, Caddisflies, Amphipoda, Mayflies, Water beetles, Diptera.

Identifiers: *Paraquat, Macroinvertebrates, *New Zealand (Waimakariri River), Ostracods, Bugs, Seed shrimp, Scuds.

During 1966 and 1967, paraquat was applied on three occasions at 2 ppm for 30 min to control aquatic weeds in the South Branch experimental stream, a tributary of the lower Waimakariri River, Canterbury, South Island, New Zealand. Effects on the invertebrate fauna of the stream were studied before, during, and after the applica-tions, by Surber and drift-net samples. After a heavy initial kill, the paraquat treatment reduced the number of amphipods caught in the drift fauna to 5 percent of the pre-treatment level, and there was a slight reduction in the numbers of hemipterans. The total numbers in Surber samples increased markedly a year after treatments ended, mainly due to increased numbers of trichopterans. (Holoman-Battelle) W74-01298

LOSS OF PHOTOSYNTHETIC ACTIVITY IN TWO BLUE-GREEN ALGAE AS A RESULT OF York Univ., Downsview (Ontario). Dept. of Biolo-

gy. For primary bibliographic entry see Field 05B. W74-01302

PROTOZOA FROM BLUE LAKE, RAOUL

ISLAND, Massey Univ., Palmerston North (New Zealand). Dept. of Microbiology and Genetics. T. J. Brown, and J. A. Peart.

New Zealand Journal of Marine and Freshwater Research, Vol 7, Nos 1/2, p 171-178, June 1973. 2 fig, 1 tab, 11 ref.

Descriptors: "Hydrogen ion concentration, "Protozoa, "Water quality, Mud, Benthos, Sampling, Population, Adaptation. Identifiers: Amoeba, Acanthamoeba, Aulacantha,

Paramecium, Vorticella, Euplotes, On-cychodromus, Oxytricha, *New Zealand (Blue Lake), Species diversity.

Protozoa were collected in universal bottles from four microhabitats of Blue Lake: (1) within the bottom mud, (2) on the surface of the mud, (3) from midwater, and (4) from the water surface. The pH of each sample was determined at the time of collection and regularly throughout the observation period in the laboratory. Upon arrival at the laboratory, samples were transferred to petri dishes and maintained for observation without the addition of enrichment media. Protozoan popula-tions were measured with a modified Fuchs-Rosenthal haemocytometer, and classification and identification were carried out by staining and ob-servation by light microscropy and by phase con-trast microscopy. The in situ pH values of the four microhabitats ranged from 6.8 to 9.0. After 2 days in vitro, the mud zones showed a marked drop in pH. The protozoan population contained few species, all showing a well developed ability to endure a wide pH range and/or related phenomena such as redox potential. The genera represented were Amoeba, Acanthamoeba, Aulacantha, Paramecium, Vorticella, Euplotes, Oncychodromus, and Oxytricha. (Little-Battelle) W74-01310

FIELD AND EXPERIMENTAL STUDIES ON THE EFFECTS OF A POWER STATION EF-FLUENT ON TUBIFICIDAE (OLIGOCHAETA,

ANNELIDA), Central Electricity Generating Board, Ratcliffe-on-Soar (England). Freshwater Biology Unit.

Hydrobiologia, Vol 42, Nos 2/3, p 225-242, August 15, 1973. 10 fig, 4 tab, 16 ref.

Descriptors: "Tubificids, "Powerplants, "Heated water, "Water pollution effects, Effluents, An-nelids, On-site investigations, Laboratory tests, Water temperature, Dissolved oxygen, Animal physiology, Upstream, Downstream, Oligochaetes, Invertebrates, Bottom sampling, Reproduction, Cooling water, Animal populations, Mortality, Aquatic animals, *Thermal pollution. Identifiers: Population density, Limnodrilus hoffmeisteri, Limnodrilus profundicola, Tubifex tu-bifex, Limnodrilus udekemianus, *United Kingdom (River Trent).

Group 5C-Effects of Pollution

In order to study the effects of power plant effluents on tubificids, mud cores containing tu-bificids were collected downstream from three power plants which discharge warm condenser water into the River Trent. The worms were removed from the formalin-preserved cores and counted. Laboratory experiments were conducted to determine the effects of temperature on the reproductive rate of Limnodrilus hoffmeisteri and Tubifex tubifex and the combined effects of dissolved oxygen concentration and temperature on the reproductive rate of L. hoffmeisteri. Higher numbers of sexually mature worms of L. hoffmeisteri were found in the River Trent downstrem from Dradelow Power Stations than upstream. In the laboratory experiments it was found that: L. hoffmeisteri increased its rate of egg production with increase in temperature up to about 25 C while T. tubifex maintained a fairly steady rate of egg and cocoon production over a wide range of oxygen concentrations above 2 ppm. It seems likely that the difference between the numbers of sexually mature L. hoffmeisteri upstream and downstream from the power station were influenced more by the increased temperature, than in increased oxygen levels of the power station ef-fluent, though under extreme conditions of deoxygenation, aeration of the river by the cooling towers at the power stations could increase the abundance of this species. (Holoman-Battelle) W74-01312

THE ECOLOGY OF THE DIATOMS OF THE KLIP RIVER, SOUTHERN TRANSVAAL, University of the Witwatersrand, Johannesburg

(South Africa). Dept. of Botany. F. D. Hancock.

Hydrobiologia, Vol 42, Nos 2/3, p 243-284, August 15, 1973. 5 fig, 2 tab, 33 ref, 2 append.

Descriptors: *Diatoms, *Ecology, *Aquatic algae, *Biological communities, Water properties, Water quality, Bioindicators, Chrysophyta, Physical properties, Chemical properties, Hydrogen ion concentration, Nitrogen, Dissolved oxygen, Alkalinity, Water pollution, Water sampling, Calcium, Industrial wastes, Conductivity, Sulfates, Dissolved solids, Magnesium, Turbidity, Ammonia, Nitrates, Bicarbonates, Iron, Chlorides, Statistical methods.

Identifiers: *South Africa (Klip River), Sample preparation, Sample preservation, Data interpretation, Frustulia rhomboides, Neidium affine, Fragilaria construens, Synedra tabulata, Surirella angusta, Melosira distans, Navicula ammophila, Nitzschia filiformis, Nitzschia kuetzingiana, Nitzschia laevidensis, Navicula thomasii, Achnanthes lanceolata.

Diatom associations formed by 2 percent or more of species, found by the Thomasson analysis method, are discussed in relation to the physical and chemical vicissitudes of a stream in which the head waters become cut off from those of the middle reaches by a barren zone caused by mineral and acid pollution from dumps resulting from the gold-mining industry on the Witwaterstrand. As-sociations are found indicative of the originating waters, of regions of instability due to the pollution, whether it be its onset or recovery therefrom and of the lower recovered middle reaches. In each reach there are found to be associations indicative of pH, nitrogen content, dissolved oxygen and alkalinity. Thus the associations enable one to 'read' the conditions of the river. An additional association occurs at the very turbid mouth of the river which is indicative of low light requirement. The work supports the findings of Cholnoky (1958 et seq.) in his researches into the diatom ecology of South African streams. (Holoman-Battelle)

NUTRIENT REMOVAL USING LEMNA MINOR.

Florida Dept. of Pollution Control, Tallahassee. R. M. Harvey, and J. L. Fox.

Journal Water Pollution Control Federation, Vol 45, No 9, p 1928-1938, September 1973. 9 fig, 6 tab,

Descriptors: *Bioassay, *Nutrients, *Digestion, *Nutrient removal, Nitrates, Nitrites, Phosphates, Potassium, Copper, Magnesium, Calcium, Zinc, Manganese, Iron, Sodium, Aluminum, Colorimetry, Nitrogen, Chlorophyll, Growth rates, Water analysis, Waste water (Pollution), Water treatment, Phosphorus, Flame photometry, Colorimetry,

l'Identifiers: Bioaccumulation, *Lemna minor, "Cattle feed, Forageability, Biological samples, Wolffia columbiana, Salvinia rotundifolia, Removal, Emission spectroscopy, Sample preparation, Atomic a trophotometry, Chlorophyll a. absorption

Lemna minor, Wolffia columbiana, and Salvinia rotundifolia, which have potential value for removing nutrients from wastewater, were studied with respect to four characteristics: (1) rapid growth, (2) large nutrient uptake potential, (3) ease of handling, and (4) potential economic resource (use as cattle feed). Preliminary studies showed Lemna to be the most promising of the three; therefore, it was chosen for further study. Plants were grown in 8-1 aquaria containing filtered undiluted secondary wastewater recirculated from a carboy. Control and test run effluent samples were taken at 0, 2, 4, 6, 8, and 10 days to measure percent removal of Kjeldahl nitrogen, nitrate nitrogen, nitrite nitrogen, and all forms of phosphorus. Plant tissues were analyzed for N, P, K, Cu, Zn, Mn, Fe, Na, and Al by emission spectrography, colorimetry, flame photometry, and atomic absorption. Chlorophyll a and growth rates were also measured. Forageability was determined by in vitro organic matter digestion involving 48-hr fermentation followed by HCl pepsin digestion and determination of residual organic matter. Total Kjeldahl nitrogen and total phosphorus were found to decrease 86.5 and 67 percent, respectively, over a 10-day period. Lemna was found to be more digestible by cattle than common pasture grass. These characteristics, combined with a rapid growth rate, could make duckweed desirable for use in tertiary treatment of wastewater. (Little-Battelle) W74-01321

THERMOPHILIC OSTRACOD: AQUATIC METAZOAN WITH THE HIGHEST KNOWN TEMPERATURE TOLERANCE,

Oregon Univ., Eugene. Dept. of Biology. C. E. Wickstrom, and R. W. Castenholz. Science, Vol 181, No 4104, p 1063-1064, September 1973. 1 fig, 1 tab, 12 ref.

Descriptors: *Water temperature, *Bioassay, Resistance, *Thermal pollution, Water pollution effects, Lethal limit, *Heat resistance. Identifiers: *Potamocypris, *Lethal temperature, Invertebrates, Survival, Lethal dosage, Seed

Ostracods of the genus Potamocypris were collected from a thermal spring in Oregon and incubated from 1 minute up to 12 hrs. at temperatures ranging from 40 to 55.75 C to determine their thermal resistance. After exposure to elevated temperatures, the test tubes containing the organisms were immediately cooled to 40-45 C and observed for harmful effects. The upper lethal temperature ranged from 49 C for incubation of more than 5 hours to 55.75 C for 1-minute incubations. Calculated temperatures for 50 percent mortality for 60, 40, 20, 10, 5, and 1 minute of exposure were 50.44. 50.96, 51.43, 52.03, 52.77, and 55.12 C, respectively. This ostracod may have the highest temperature tolerance of any aquatic metazoan. (Little-W74-01327

N-NITROSATION BY NITRITE ION IN NEUTRAL AND BASIC MEDIUM, National Cancer Inst., Bethesda, Md. Div. of Cancer Cause and Prevention. For primary bibliographic entry see Field 05B. W74-01328

ZOOPLANKTON IN KOLYMA-INDIGIRKA LAKES (IN RUSSIAN),
For primary bibliographic entry see Field 02H. W74-01341

STUDIES OF RAPID NTA-UTILIZING BAC-TERIAL MUTANT,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters. For primary bibliographic entry see Field 05B. W74-01348

TEMPERATURE SELECTION BY JUVENILE AND ADULT YELLOW PERCH (PERCA FLAVESCENS) ACCLIMATED TO 24 C, Waterloo Lutheran Univ. (Ontario). For primary bibliographic entry see Field 05A. W74-01353

EMERGENCE, REPRODUCTION, GROWTH OF SETIPALPIAN PLECOPTERA IN SOUTHERN ONTARIO. Waterloo Univ. (Ontario). For primary bibliographic entry see Field 05A. W74-01359

ROLE OF SILT IN MICROCYSTIS AERU-GINOSA DEVELOPMENT, (IN RUSSIAN), Akademiya Nauk URSR, Kiev. Instytut

Hidrobiologii. M. I. Kuz'menko Gidrobiol Zh. Vol 8, No 1, p 38-43, 1972. Illus. (En-

glish summary). Identifiers: *Amino acids, *Fertilization, *Microcystis-Aeruginosa, Reservoirs, *Silt, Cyanphyta.

The water layer contiguous to silt is considered as a dynamic system through which absorption of bio- and organogens by silts takes place. Mixing of the 2 phase system of silt-water favors water fertilization with amino acids and other compounds, which has a positive effect on M. aeruginosa development. It is shown that when introducing silt (50 g/l of mineral medium) the number of cells of the alga increases as much as 1.5 times. Expansion of silted areas in reservoirs will promote the fertilization of tropic base for blue-green algae, in particular, the main agent of "bloom", M. aeru-ginosa. Copyright (c) 1973, Biological Abstracts,

74-01368

EPIDEMIOLOGICAL AND TOXICOLOGICAL ASPECTS OF NITRATES AND NITRITES IN THE ENVIRONMENT,
Hadassah Medical School, Jerusalem (Israel). En-

vironmental Health Lab.

H. I. Shuval, and G. P. Kalinin. Am J Public Health. Vol 62, No 8, p 1045-1052. 1972. Illus.

Identifiers: Diseases, Electroencephalogram, Environment, Epidemiological studies, Poods, Heart, Infants, Lung, Milk, *Nitrates, *Nitrites, Placental, Rat, Tomato, *Toxicological studies, Vitamin C, Potable water, *Methemoglobin.

Infants (2473) in areas with medium-high (50-90 mg/1 as NO3) and low nitrate (5 mg/1 as NO3) concentrations in drinking water were studied in an effort to determine whether there is any association between methemoglobin (MetHb) levels and nitrates in drinking water. No differences were found between the mean MetHb level in the study and control areas. A possible explanation that only

6% of the infants consumed appreciable amounts of tap water together with powdered milk formula. or up water together with powdered misk formula. The remainder were breast-fed or consumed whole cow's milk. Of the infants, 87% were fed vitamin C rich foods which are known for their anti-Methb effects. Methb levels are highest in the first 60 days of life with a mean of 1.33%. The mean MetHb level for the entire infant population studied was 1.04 plus or minus .72%. Rats chronically exposed to 2000 and 3000 mg/l NaNO2 (250cally exposed to 2000 and 3000 mg/l NaNO2 (230-350 mg/kg) in drinking water for two years showed distinct pathology in the heart and lung tissues as compared to controls. Pregnent rats given acute doses of NaNO2 varying from 2.5-50 mg/kg show transplacental passage of the chemical with the production of MetHb in the fetuses. Mice chronically exposed to 1000-2000 mg/1 NaNO2 in their water showed lowered motor activity as compared to controls. Rats with electrodes implanted on the cortex were chronically exposed to nitrites in their drinking water in concentrations ranging from 100-2000 mg/1 of NaNO2. All experimental groups showed major brain electrical activity changes as shown by EEG recordings after 2 wk as compared to their own controls and the control group. On cessation of exposed to nitrites after 2 mo., brain electrical activity changes in EEG recordings remained, suggesting some form of irreversible damage. The findings are being rechecked; if found to be correct, standards for allowable concentrations of nitrate and nitrite in food and water should be re-examined .-- Copyright 1973, Biological Abstracts, Inc. W74-01386

COPPER MICRONUTRIENT REQUIREMENT FOR ALGAE,

Missouri Univ., Columbia. Dept. of Chemistry. S. E. Manahan, and M. J. Smith.
Environmental Science and Technology, Vol 7, No 9, p 829-833, September 1973. 6 fig, 2 tab, 10

Descriptors: *Bioassay, *Copper, Growth rates, *Nutrient requirements, *Chelation, Heavy metals, Limiting factors, Nutrients, Methodology, Essential nutrients, Water pollution effects, Plant

growth. Identifiers: Identifiers: *Chlorella vulgaris, *Oocystis marssonii, Culture media, Sample preparation, Ion selective electrodes.

Copper micronutrient requirements of Chlorella vulgaris and Oocystis marssonii were determined by measuring growth rates versus copper concentration in a culture medium containing EDTA as a strong chelating agent. Since reagents used to prepare the medium contained variable amounts of Cu, electrolytic and extraction procedures were developed to purify them. The Cu concentration was monitored during purification and during growth tests with a cupric ion electrode. Growth tests were carried out in cleaned 500-ml polyethylene wash bottles to avoid erratic results which occur with glass containers. Solutions of CuSO4 in H2SO4 were diluted to prepare the Cu additions. A CO2-air mixture was bubbled through the cultures as a source of carbon and for pH control. Algal growth rates were determined by absorbance at 560 nm, and dry cell weight was measured by filtering and weighing the cells. The results show that the growth of the two algae is dependent upon the concentration of the free copper ion. Optimal growth occurred above 40 microion. Optimal growth occurred above 40 micrograms/1 for Occystis and above 30 micrograms/1 for Chlorella. It appears that the presence of natural and pollutant chelating agents in water stimulate algal growth by creating a reservoir of trace metal species. (Little-Battelle) W74-01398

LIGAND PHOTOOXIDATION IN COPPER (II) COMPLEXES OF NITRILOTRIACETIC ACID. IMPLICATIONS FOR NATURAL WATERS, Carleton Univ., Ottawa (Ontario). Dept. of Chemistry. For primary bibliographic entry see Field 05B. W74-01400

PATHWAYS OF TRACE ELEMENTS IN ARC-TIC LAKE ECOSYSTEMS, Alaska Univ., College. Inst. of Marine Science.

For primary bibliographic entry see Field 05B. W74-01401

EVALUATION OF THE RESPONSE OF DUGE-SIA TIGRINA TO AFLATOXIN B1, Virginia Commonwealth Univ., Richmond. Dept.

of Biology. G. C. Llewellyn.

Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1119-1122, September 1973. 1 fig, 22 ref.

Descriptors: *Bioassay, *Toxicity, *Bioindicators, Animal growth, Laboratory tests, Laborator ry animals, Invertebrates, Water pollution effects, Evaluation, Toxins, Mortality, Animal pathology, Lethal limit, Aquatic animals.

Identifiers: *Dugesia tigrina, *Alflatoxin B1, *Planarians, Regeneration, Sensitivity, Flatworms, Phytotoxins, Mycotoxins.

Groups of brown planaria, Dugesia tigrina, were exposed to varying concentrations of aflatoxin B1. Whole animals maintained in 3.125 micrograms/ml of toxic solution showed 50 percent lethality in 2 days; 1.562 micrograms/ml required 4 days; 0.781 microgram/ml required 7 days; and 0.312 microgram/ml required 15 days. Even greater lethal responses occurred when cut portions of planaria were exposed to the toxin, with the head sections in all concentrations showing higher levels of lethality than the tail sections. Regeneration of ex-cised heads and tails was inhibited in 3.125 micrograms/ml medium; minimal regeneration occurred in 1.562 and 0.781 microgram/ml environments. D. tigrina, exposed to concentration levels of 0.312 and 0.156 microgram/ml of aflatoxin B1 in spring water, regenerated head and tail portions in a normal manner. No gross pathological abnormalities were observed in any regenerated tissue. The lethal response to low concentrations of the toxin suggests that the head portion of D. tigrina is one of the more sensitive organisms to aflatoxin B1. (Holoman-Battelle) W74-01404

DIELDRIN. EFFECTS OF CHRONIC SUBLETHAL EXPOSURE ON ADAPTATION TO THERMAL STRESS IN FRESHWATER

Academy of Natural Sciences of Philadelphia, Avondale, Pa. Stroud Water Research Center. E. K. Silbergeld.

Environmental Science and Technology, Vol 7, No 9, p 846-849, September 1973. 2 fig, 3 tab, 31

Descriptors: *Darters, *Bioassay, *Thermal pollu-tion, *Dieldrin, Fish physiology, *Animal metabolism, Toxicity, Water temperature, Growth rates, Water pollution effects, Mortality. Identifiers: *Pretreatment, Chronic tests.

The freshwater fish, Etheostoma nigrum, were pretreated with 2.3 ppb dieldrin for 30 days and then exposed to thermal stress by heating the water at a rate of 1 C/hr to a maximum of 7-9C above ambient temperature. These conditions simulate natural conditions which can occur in the U. S. Results were assessed by exposing other groups of fish to dieldrin alone or to thermal stress alone. Several indicators of metabolism and condition were measured during pretreatment, during thermal stress, and at the end of the tests: growth rate, feeding rate, whole blood glucose levels, oxygen consumption, rate of opercular movement, whole body lipid content, condition of liver, and liver histology. Pretreated fish demonstrated sig-nificant changes in all of the above parameters except opercular movement during the first 15 days of exposure to dieldrin. After 15 days, pretreated fish were found to have adapted to dieldrin exposure, as indicated by significant reversals of the above changes (except for liver damage, which was not reversed but progressed over time). In the adapted state, the pretreated fish remained dif-ferent from untreated fish, in terms of these parameters. These differences provide grounds for predicting differential response to sublethal thermal stress for the pretreated and untreated fish. Such response is discussed as it may relate to the effects of chronic sublethal exposure to dieldrin. (Little-Battelle) W74-01408

DISTRIBUTION OF ALKYL ARSENICALS IN MODEL ECOSYSTEM,
Agricultural Research Service, Beltsville, Md.

Agricultural Environmental Quality Inst. A. R. Isensee, P. C. Kearney, E. A. Woolson, G.

E. Jones, and V. P. Williams.

Environmental Science and Technology, Vol 7, No 9, p 841-845, September 1973. 2 fig, 4 tab, 13

Descriptors: *Bioassay, Model studies, Toxicity, *Snails, *Waterfleas, Freshwater fish, *Chlorophyta, Absorption, Food chains, Path of pollutants, Distribution patterns, Ecosystems, Arsenicals (Pesticides).

Identifiers: Bioaccumulation, Biomagnification, *Cacodylic acid, *Dimethylarsine, *Mosquitofish, Scintillation counting, Macroinvertebrates, Sam-ple preparation, Biological samples, Physa, Daphnia magna, Gambusia affinis, Oedogonium cardiacum, Alkyl arsenicals.

Mosquitofish (Gambusia affinis), waterfleas (Daphnia magna), snails (Physa), and algae (Oedogonium cardiacum) were exposed to C-14-labeled cavodylic acid (CA) and dimethylarsine (DMA), for 3, 29, 32, and 32 days, respectively, in a model ecosystem. The model systems consisted of glass aquaria 25.4 X 5.2 X 17.8 cm filled with 4 liter of standard reference water with increased NH4NO3 and K2HPO4. CA was added directly and DMA was adsorbed on soil and added to the system. After exposure for the specified period, bioaccumulation and biomagnification were determined in the organisms. Algae and Daphnia were ground, combusted in oxygen, and the evolved CO2 assayed for radioactivity by liquid scintillation counting. Fish and snails were homogenized tion counting. Fish and snails were homogenized in methanol, filtered, the filtrate concentrated and radioactivity determined by liquid scintillation counting. The organisms thrived in the model system indicating that CA and DMA were not toxic. Lower food chain organisms (algae and Daphnia) bioaccumulated more CA and DMA than did higher food chain organisms (snails and fish). Amounts accumulated indicate that CA and DMA do not show a high potential to biomagnify in the environment. An increase in biomass (primarily algae) over 32 days largely accounted for a gradual loss of CA and DMA from solution. (Little-Bat-W74-01409

METABOLISM AND BILIARY EXCRETION OF SULFOBROMOPHTHALEIN BY RAINBOW TROUT (SALMO GAIRDNERI).

Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.

D. C. Schmidt, and L. J. Weber.

Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1301-1308, September 1973. 2 fig, 4 tab, 27 ref.

Descriptors: *Animal metabolism. *Rainbow trout, *Bioassay, Dyes.

Identifiers: *Sulfobromophthalein, *Elimination, *Bile, Plasma, Blood, Transport maximum, Excretion.

Group 5C-Effects of Pollution

Biliary excretion of sulfobromophthalein (BSP) by rainbow trout as studied in free-swimming fish and in fish immobilized by spinal transection or anesthetization with M.S. 222. Bile was collected by catheterizing the common bile duct with PE 10 tubing and ligating the cystic duct. Plasma decay of BAP was determined by injecting 5, 10, and 15 mg/kg of BSP in Cortland's saline into the caudal vein. A single blood sample was then obtained by cardiac puncture. BSP and metabolites in bile were measured by colorimetry. The transport maximum (TM) was determined by infusing the dye into a cannulated ventral intestinal vein and collecting bile from the bile duct. Excretion of BSP across gills and into the urine was tested by analyzing water and urine samples. The plasma half-life of BSP was 13 min for doses of 5 and 10 mg/kg and 29 min for a dose of 15 mg/kg. The biliary BSP transport maximum (Tm) averaged 9.6 micrograms min per kg for five fish while the blood clearance averaged 1.7 ml/min per kg for two fish. Normal bile flows of 0.87 microliter/min per kg in trout were increased upon anesthetization but were unaffected in fish allowed to recover from spinal transection. The data presented support the conclusion that the transport of BSP from liver cells to bile is the rate-limiting step in the excretion of this dye. (Little-Battelle) W74-01411

UPTAKE OF METHYL MERCURIC CHLORIDE AND MERCURIC CHLORIDE BY TROUT: A STUDY OF UPTAKE PATHWAYS INTO THE WHOLE ANIMAL AND UPTAKE BY ERYTHROCYTES IN VITRO, Michigan State Univ., East Lansing. Dept. of

Figure 19 Property of the Fisheries Research Board of Canada, Vol 30, No 9, p 1293-1299, September 1973. 2 fig, 2 tab, 24 ref.

Descriptors: *Rainbow trout, *Bioassay, Water pollution effects, Animal metabolism, Distribu-tion, Mercury, *Heavy metals, Radioactivity techniques.

Identifiers: *Bioaccumulation, *Mercury compounds, *Metabolic pathways, Methylmercury chloride, Mercury chloride, In vitro tests, Blood, Scintillation counting, Biological samples, Tissue, Gills, Liver, Kidneys, Heart, Muscle, Stomach, Intestine, Sample preparation.

Rainbow trout (Salmo gairdneri) were exposed for 24 hours to 275 mg/l of Hg as HgC12 or CH3HgC1 (both labeled with Hg-203) to determine the uptake pathways and to ascertain some of the properties of mercury interaction with teleost-nucleated erythrocytes. To assess the role of the gastroin-testinal (GI) tract, the GI pathway was eliminated in one group of fish by esophageal ligation. After exposure, blood samples were taken, the fish killed, and tissues samples taken from the gills, liver, kidney, heart, skeletal muscle, stomach, and intestine for determination of Hg content. Distribution and cellular uptake of Hg in blood was determined by incubation with either compound and subsequent separation of the cell and plasma components. Uptake of mercury by the fish was not affected by esophageal ligation, and it is con-cluded that uptake occurs primarily by way of the gills. Methyl mercury enters the fish at a faster rate than the inorganic form and anomalous tissue distribution of these two mercurials suggest that inorganic mercury does not require methylation prior to entry into the fish. In vitro experiments using radioactive mercurials demonstrated high affinity of methyl mercury for red cells, (up to 90 percent was bound to red cells in 40 min). Only 9 percent of inorganic mercury was taken up by red cells, but, this percentage was increased up to 65 percent if the cells were washed and suspended in Ringer solution prior to incubation with mercury. (Little-Battelle) W74-01412

EFFECT OF SPOIL DISPOSAL ON BENTHIC

INVERTEBRATES,
Delaware Univ., Lewes. Coll. of Marine Studies.
W. Leathem, P. Kinner, D. Maurer, R. Biggs, and

W. Treasure. Marine Pollution Bulletin, Vol 4, No 8, p 122-125, August 1973. 1 fig, 1 tab, 11 ref.

Descriptors: *Benthic fauna, Environmental effects, *Dredging, *Water pollution effects, Marine animals, Dye dispersion, Water quality, Soil analysis, Crustaceans, Dominant organisms, Water analysis, Aerial photography, Bottom sampling, Water sampling, Hydrograph analysis, Waste disposal, Marine geology, Marine biology, Currents (Water), Surface waters, Subsurface flow, Bathymetry, Salinity, Chemical analysis, Inver-tebrates, Carbon.

Identifiers: *Macroinvertebrates, *Spoil disposal, *Delaware Bay, Polychaetes, Nemerteans, Echin-oderms, Bryozoa, Species diversity, Species density, Physical oceanography, Pelecypoda, Beach fleas, Hermit crabs, Decapods, Shannon-Weaver diversity index, Species diversity index, Rhodamine B.

Hydraulic dredging and spoil disposal behind the inner breakwater in Delaware Bay were studied along with their gross effects on benthic macroinvertebrates. Rhodamine B dye was used to establish the surface flow pattern during flood and ebb tides. Water analyses and aerial photography (color-band and infrared film) were used to trace dye dispersion. A drogue study was performed simultaneously to determine subsurface current flow. 103 sites were sampled for salinity, oxygen, biological and geological analyses. To evaluate the dispersion of spoils, bathymetric surveys were performed before and after disposal using a Raytheon precision depth recorder. The settling rate of the deposited spoil was determined using a sample taken from the discharge pipe. The water content was measured and compared with samples taken in the area of the final spoil distribution. The dissolved oxygen concentration fell after dredging, approaching the minimum water quality standard of 50 percent saturation for the State of Delaware. Salinity was fairly constant and the temperature range was 5.4-19.6 C. The density of individual macroinvetrates was low and the number of species rarely exceeded 10 0.1 sq m with the greatest damage to these animals occurring in the dreding and dump sites. The total impact of the operation, however, appeared to have been small. (Holoman-Battelle)
W74-01420

AN IMPROVED METHOD OF CELL ENU-MERATION FOR FILAMENTOUS ALGAE AND

Medical Coll. of Ohio, Toledo. Dept. of Microbiology.

For primary bibliographic entry see Field 05A.

W74-01421

THE EFFECTS OF BACTERIA ON THE GROWTH AND REPRODUCTION OF OEDOGONIUM CARDIACUM, California Univ., Berkeley. Dept. of Botany.

L. Machlis L. Macnus.

Journal of Phycology, Vol 9, No 3, p 342-344, September 1973. 1 fig, 1 tab, 8 ref.

Descriptors: *Cultures, *Reproduction, *Growth rates, Chlorophyta, Bioassay, Plant growth.
Identifiers: *Oedogonium cardiacum,
*Corynebacterium, *Pseudomonas putida, Culture

Isolates of male and female Oedogonium car-diacum for which defined media had been established were subsequently found to be con-taminated with a species of Corynebacterium which failed to grow in the nutrient broth used to test for contamination. After the cultures were rendered axenic through treatment with penicillin G, they failed to develop oogonia or sperm except occasionally at a very low level. The addition of small amounts of the bacterium increased the development of the reproductive structures; however a much more striking increase was obtained by constantly infecting the algal cultures with Pseudomonas putida. Neither of the bacteria increased growth as measured by dry weight; however, the P. putida resulted in the growth of very long filaments in contrast to the short filaments characteristic of both the axenic cultures and those infected with Corynebacterium sp. (Little-Battelle) W74-01422

OBSERVATIONS ON THE ECOLOGY OF LAMINARIA SINCLAIRII O NORTHERN OREGON BEACHES, ON

Arch Cape Marine Labs., Oreg. J. W. Markham.

Journal of Phycology, Vol 9, No 3, p 336-341, September 1973. 7 fig, 2 tab, 6 ref.

Descriptors: *Marine algae, *Phaeophyta, Environmental effects, *Biological communities, *Ecology, Plant growth, Life cycles, Seasonal, Ecological distribution, Beaches, Marine plants, Growth rates, Dominant organisms, *Oregon, Onsite investigations, Tidal effects, Water temperature, Salinity, Sea water, Chlorophyta, Water sampling.

Identifiers: *Laminaria sinclairii, Marine habitats, Laminari setchellii, Phyllospadix scouleri, Gymnogongrus linearis, Bossiella plumosa, Dilsea california, Ptilota pectinata, Ptilota filicina, Plitota asplenioides, Prionitis lyallii, Microcladia borealis, Iridaea, Farlowia mollis, Codium setchellii, Phaeostrophion irregulare.

Laminaria sinclairii (Harvey) Farlow, Anderson and Eaton occurs only on the Pacific Coast of North America and is usually restricted to rocks on beaches subjected to moderate to heavy surf and a large seasonal fluctuation in sand level. It was observed and measured over a 2-year period on 3 such beaches in northern Oregon. Growth rate and relative dominance are greatest in the lowest and most exposedparts of the intertidal zone, where surf action and sand burial are greatest. The sand level begins to build up on the beach in April and continues to rise, burying the plants, throughout the summer, until the heavy storms in fall again remove the sand. Maximum growth occurs in early summer, prior to burial. The blades are lost in December and regenerated in January. Ripe sori are produced on the old blades just before they are lost and on the new blades just after they appear. The gametophytes which develop from spores produced by these sori apparently do not usually produce sporophytes. In March and April there is considerable production of new stipes and blades from the haptera at the margins of the holdfast and this is apparently the chief means of reproduction. (Holoman-Battelle) W74-01423

PHYSIOLOGICAL ECOLOGY OF GELIDIELLA ACEROSA (FORSSKAL) FELDMANN HAMEL.

Saurashtra Univ., Rajkot, (India). Dept. of Biosciences.
P. S. Rao, and V. B. Mehta.

Journal of Phycology, Vol 9, No 3, p 333-335, September 1973. 2 fig, 13 ref.

Descriptors: *Marine algae, *Rhodophyta, *Plant physiology, Physiological ecology, Laboratory tests, Environmental effects, *Salinity, *Hydrogen ion concentration, Cultures, Plant growth substances, Growth rates, Nitrogen, Phosphates, Sea water, *Nutrients, Plant growth, Marine plants, Ureas, Phosphorus, Bioassay, Benthic flora.

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Effects of Pollution—Group 5C

Identifiers: *Gelidiella acerosa, Nutrient sources, Culture media, Indole acetic acid, Sodium nitrate, Sodium dihydrogen phosphate, Gibberellic acid.

The physiological responses to various ecological factors including salinity, pH, and nutritional and growth substances of Gelidiella acerosa have been investigated in reference to its growth along coasts and in lagoons and backwaters. Samples of the alga were collected from tide pools during low tide and cultured in enriched, pasteurized seawater. NaNo3 and urea were used as nitrogen sources and NaH2P04 as the phosphate source. Different concentrations of IAA and GA were also tried on the growth and production of proliferations. Increase in axis length and the number of proliferations produced were criteria for judging physiological responses. NaNO3 was found to be a better nitrogen source than urea and NaH2PO4 was an effective phosphorus source except at 10 mg/l concentration. Growth-promoting substances were necessary to increase production of poliferations and to hasten vegetative growth; IAA was quite effective at 70-85 mg/1 whereas GA was relatively ineffective. Salinity concentrations that were 2 and 4 times that of natural seawater and a pH range of 8.2-9.2 resulted, respectively, in proliferations equal to and greater than that of the controls in natural seawater. (Holoman-Battelle) W74-01424

MODIFICATIONS IN FILTRATION METHODS FOR THE MEASUREMENT OF INORGANIC C--14 UPTAKE BY PHOTOSYNTHESIZING AL-GAE.

Kinnerat Limnology Lab., Tiberias (Israel). For primary bibliographic entry see Field 05A. W74-01425

ELECTROPHORETIC AND IMMUNOLOGICAL ANALYSES OF SEVEN CHLOROSAR-CINACEAN ALGAE,

Louisiana State Univ., New Orleans. Dept. of Biological Sciences.

For primary bibliographic entry see Field 05A. W74-01426

SALINITY ADAPTATION BY DUNALIELLA TERTIOLECTA. I. INCREASES IN CARBONIC ANHYDRASE ACTIVITY AND EVIDENCE FOR A LIGHT-DEPENDENT NA (PLUS)/H (PLUS) EXCHANGE,

State Univ. Coll., Geneseo, N.Y. Dept. of Biology.

A. H. Latorella, and R. L. Vadas. Journal of Phycology, Vol 9, No 3, p 273-277, September 1973. 4 fig, 3 tab, 23 ref.

Descriptors: *Ion exchange, Hydrogen ion con-centration, *Enzymes, Light, *Bioassay, *Sodi-um, *Cytological studies, Cultures, Aquatic algae, *Salinity, Growth rates, Adaptation, Ions. Identifiers: *Dunaliella tertiolecta, Carbonic an-

Cells of Dunaliella tertiolecta adapted to 0.5 M NaCl were axenically cultured to investigate H (plus) incorporation, Na (plus) extrusion, and carbonic anhydrase levels in response to changes in external Na (plus) concentrations. Cell densities were determined with a Celloscope electronic par-ticle counter. The Na (plus) content of cells was determined by flame photometry. Proton incor-poration was assessed by changing the salinity of the cell suspension solutions and monitoring the pH change ever 2.5 minutes. Carbonic anhydrase was assayed by bubbling CO2 through the suspensions to decrease the pH and then measuring enzyme activity. When Dunaliella tertiolecta was transferred to higher salinities, there was a lag in growth, suggesting an adaptation period. Since there was no significant difference in the Na (plus) content of cells grown between 0.5 and 3.5 M NaCl, a mechanism for Na (plus) extrusion or ex-clusion was indicated. Increasing the salinity of cell suspensions stimulated an incorporation of H (pius) by the cells, suggesting an H (plus)/Na (plus) exchange. Cells adapted to higher salinities had increased carbonic anhydrase activity, suggesting that increased CO2 or HCO3 (minus) transport may be required at higher salinities. Growth at salinities above 2.5 M required continuous illumination; therefore a light-driven H (plus)/Na (plus) exchange accompanied by a HCO3 (minus) influx is proposed. (Little-Battelle) W74-01427

SOME THOUGHTS ON NUTRIENT LIMITA-TION IN ALGAE, Dunstaffnage Marine Research Lab., Oban (Scot-

M. R. Droop.

Journal of Phycology, Vol 9, No 3, p 264-272, September 1973. 14 fig, 15 ref.

Descriptors: *Nutrients, *Limiting factors, *Cultures, *Algae, *Absorption, *Growth rates, *Mathematical models, Equations, Biomass, Plant growth.

Identifiers: Bioaccumulation, Substrates, Luxury consumption.

An empirical relation relating specific growth rate in steady state systems to nutrient status with respect to more than one nutrient simultaneously is proposed, based on 3 experimentally verifiable postulates: (1) that uptake depends on the external substrate concentration; (2) that growth depends on the internal substrate concentration; and (3) in a steady state system specific rate of uptake (in the absence of significant excretion) is necessarily the product of the specific growth rate and internal substrate concentration. The implications of this model are discussed in particular in respect to the concept of luxury consumption and Liebig's law of minimum. Some aspects of uptake in transient situations are also discussed. (Little-Battelle) W74-01428

ALGAL SUCCESSION ON ARTIFICIAL REEFS IN A MARINE LAGOON ENVIRONMENT IN GUAM,

Guam Univ., Agana. Marine Lab.

Guain Only, Agaia. Maine Lac. R. T. Tsuda, and H. T. Kami. Journal of Phycology, Vol 9, No 3, p 260-264, September 1973. 6 fig, 1 tab, 7 ref.

Descriptors: *Rhodophyta, *Cyanophyta, *Chlorophyta, *Phaeophyta, Climax, *Succession, Population, Browse utilization, Reefs, Marine algae, Lagoons, Diatoms. Identifiers: *Artificial reefs, Tires, *Guam

Two artificial reefs were constructed from automobile tires in a marine lagoon in Guam, one in November 1969 and the other in October 1970, and studied for algal succession from January 1970 to February 1972. Monthly cuttings were taken from the tires for identification and quantification of the algae. The increase in number of additional species found each month was plotted to approximate the found each month was pioted to approximate the time span for climax to occur. A total of 18 species of algae (5 Cyanophyta, 3 Chlorophyta, 6 Phaeophyta, and 4 Rhodophyta) was found at both reefs during the 26-mo period. The algal species were of 2 types-the turf which rarely exceeded 2 mm in height and the macroalgae which exceeded 10 mm in height. The number of species present during any one month varied from 1 to 8. The mean number of species per month was 4.4 and 4.6. Filamentous algae, ie, Calothrix crustacea, Feldmannia indica, and Sphacelaria tribuloides, were the primary colonizers; the fleshy brown alga, Dictyota bartayresii, appeared soon after. Lobophora variegata was the only alga present which occurred seasonally. Low light penetration through the silty lagoon water and selective browsing by herbivorous fishes favored the blue-greens Calothrix crustacea and Microcoleus lyng-byaceus to be the dominant algae in the climax community which occurred within a 1-year period. (Little-Battelle) W74-01429

KINETICS OF SILICON-LIMITED GROWTH IN THE MARINE DIATOM THALASSIOSIRA PSEUDONANA HASLE AND HEIMDAL (EQUALS CYCLOTELLA NANA HUSTEDT), oods Hole Oceanographic Institution, Mass. R. R. L. Guillard, P. Kilham, and T. A. Jackson Journal of Phycology, Vol 9, No 8, p 233-237, September 1973. 1 fig, 2 tab, 26 ref.

Descriptors: *Silicates, *Growth rates, Limiting factors, *Succession, *Bioassay, *Diatoms, Nutrients, Primary productivity, Cultures, Kinetics. Identifiers: Thalassiosira pseudonana, *Sargasso Sea. Silicon.

The half-saturation constant (K sub s) for growth and the maximum growth rate (mu sub max) were determined for 2 clones of Thalassiosira pseudonana (equals Cyclotella nana) under conditions in which external silicon concentrations controlled growth. The estuarine clone (3H) had a higher halfsaturation constant (0.98 micromole Si) and maximum growth rate (3.6 divisions/day) than the clone from the Sargasso Sea (0.19 micromole Si, 2.1 divisions/day). The K sub s values for each clone are such that the silicate levels found at certain times in both the Sargasso Sea and the coastal regions are rate limiting to growth, hence can be of significance to plant production and to species succession. The yield data are consistent with the concept that growth rate and cellular silicon content vary together in silicon-limited cultures. (Little-Battelle) W74-01431

SUPERSATURATION OF NITROGEN IN WATER DURING PASSAGE THROUGH HYDROELECTRIC TURBINES AT MAC-TAQUAC DAM.

Environmental Protection Service, Halifax (Nova

J. R. MacDonald, and R. A. Hyatt.
Journal of the Fisheries Research Board of
Canada, Vol 30, No 9, p 1392-1394, September
1973. 2 tab, 6 ref.

Descriptors: *Nitrogen, *Supersaturation, *Air, *Fishkill, *Hydroelectric plants, Water pollution effects, Water pollution sources, Dissolved oxygen, Eels, Salmon, Atlantic salmon, Water analysis, Aeration, *Canada.

Identifiers: Gasometric analyzer, Winkler Method, *Mactaquac Dam (N.B.), American eel.

During 1968, two fish kills occurred below the Mactaquac Hydroelectric Station on the St. John River, New Brunswick. Examination of dead and dying salmon (Salmo salar) and eels (Anguilla rostrata) revealed gas bubbles beneath the skin which is generally associated with supersaturation of water with air. Since the kill occurred at the time of reduced power generation, water above and below the station was analyzed for oxygen and nitrogen saturation under low and high generating conditions. Dissolved oxygen was determined by the Winkler method and nitrogen with a microgasometric analyzer. The results showed that concentrations of dissolved oxygen and nitrogen gases were substantially increased when water passed through the turbine generating system at low generating levels. Concentrations of dissolved nitrogen gas increased by as much as 20 percent above atmospheric equilibrium. (Little-Battelle) W74-01432

Group 5C-Effects of Pollution

GROWTH RATES OF INTERTIDAL MOL-LUSCS AS INDICATORS OF EFFECTS OF UNEXPECTED INCIDENTS OF POLLUTION, Fisheries Research Board of Canada, St. John's (Newfoundland). Biological Station.

Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1385-1388, September 1973. 2 tab, 8 ref.

Descriptors: *Biondicators, *Mussels, Water pol-Descriptors: "Bionicators," Mussels, water pol-lution effects, "Phosphorus, "Growth rates, Tox-icity, Animal growth, Snails, "Canada. Identifiers: "Periwinkles, Macroinvertebrates, Mytilus edulis, Littorian littorea, "Long Harbour

(Newfoundland).

Shells of mussels, Mytilus edulis, and periwinkles, Littorina littorea, from several locations were used to determine the effects of phosphorus pollu-tion is Long Harbor, Newfoundland. Such effects were recorded using check marks on the shells. Examination of numerous shells indicated that check marks in both species were probably annual marks. Growth rates of Mytilus in 1969, the year of significant elemental phosphorus pollution at Long Harbour, were no different from those in preceding or succeeding years. No Littorina alive in 1969 occurred at Long Harbour, but they were abundant at other locations. This sort of analysis, used with caution because effects of pollutants may be confounded with effects of other variables, provides a method of examining nonlethal effects of unexpected polluting events. (Little-Battelle) W74-01434

PROBABLE CAUSES FOR THE 1972 RED TIDE IN THE CAPE ANN REGION OF THE GULF OF MAINE.

New Hampshire Univ., Durham, Dept. of Botany, H. F. Mulligan.

Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1363-1366, September 1973. 2 tab, 13 ref.

Descriptors: *Distribution patterns, *Meteorological data, *Red tide, *Dinoflagellates, Pyrrophyta, Rain, Upwelling, Environmental effects, Marine algae. Nuisance algae.

Identifiers: *Causative factors, tamarensis, Flagellates, *Gulf of Maine.

In an attempt to identify causal factors for the occurrence of the red tide bloom in the Gulf of Main during September 1972, data on spatial, temporal, and vertical distributions of Gonvaulax tamarensis were reviewed for the vicinity of Cape Ann. When considered with meteorological records, the probable causes of the bloom were identified: (1) an upwelling of deep water, (2) development of a population of G. tamarensis during unusually dry weather in August, and (3) heavy rainfall in September. (Little-Battelle) W74-01435

BEHAVIORAL RESPONSES TO CHANGES IN HYDROSTATIC PRESSURE AND LIGHT DUR-ING LARVAL DEVELOPMENT LOBSTER HOMARUS GAMMARUS, Marine Biological Station, Port Erin, Isle of Man

(England). G P Ennis

Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p1349-1360, September 1973. 9 fig, 3 tab, 13 ref.

Descriptors: *Lobsters, *Larvae, *Bioassay, *Hydrostatic pressure, Laboratory equipment, Light intensity, Distribution, Depth. Identifiers: Homarus gammarus, Macroinver-

Larvae of the lobster, Homarus gammarus, were examined with respect to the role of pressure sen-

sitivity as a depth-regulatory mechanism in an attempt to obtain clues to their distribution in nature. Pressure sensitivity was assessed by placing larvae of different stages in a 76-cm Plexiglass cylinder which could be pressurized with a tire pump. Tests were conducted in darkness and with overhead light of varying intensity. Larvae were also release in the sea and observed by divers. (Little-Battelle) W74-01436

COUPLING CARBON FLOW THROUGH SOME PELAGIC AND BENTHIC COMMUNITIE Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.

For primary bibliographic entry see Field 05B. W74-01437

STREAM COMMUNITY RESPONSE TO NUTRIENT ENRICHMENT,

Michigan State Univ., East Lansing. Inst. of Water Research R. A. Cole

Journal Water Pollution Control Federation, Vol 45, No 9, p 1874-1888, September 1973. 3 fig, 6 tab,

Descriptors: Water pollution effects, Inorganic compounds, Natural streams, *Biological commu-*Ecological distribution, Primary productivity, Waste water (Pollution), Periphyton, Benthic fauna, Metabolism, *Pennsylvania, Nematodes, Mollusks, Crustaceans, Aquatic insects, Dominant organisms, Annelids, Aquatic algae, Waste water treatment, Respiration, Sewage effluents, Suspended solids, Chemical properties, Standing crops.

Identifiers: *Spring Creek (Penn), *Species diversity, *Nutrient enrichment, Macrophytes, sity, *Nutrient enrichment, Macrophytes, Macroinvertebrates, Flatworms, Sample preservation, Species diversity index, Enrichment, Orthophosphates, Kjeldahl nitrogen, Reaeration coefficients, Surber sampler, Elodea canadensis, Potamogeton crispus, Crisp pondweed, Bugs, Waterweed, Hirudinea, Pelecypoda, Scuds, Damselflies, Leeches, Tubifex tubifex, Lirceus brachyurus, Sowbug, Planarians, Dugesia brachyurus, Sowbug, Planarians, Dugesia doratocephala, Platyhelminthes, Gyraulus, Physa, Chironomus, Ephemerella rotunda

A study was conducted on Spring Creek in Pennsylvania to examine the effects of inorganic enrichment from the State College wastewater treatment plant. Particular reference was made to the impact of a change in structure of the primary producer assemblage on the community structure and function. Sampling was designed to compare stream sites that were physically similar. Standing crops of macrophytes were estimated at 9 sites and gross primary productivity and community respiration were estimated from diurnal changes in dissolved oxygen concentrations between 2 sampling stations. The sedimented edges of pools and riffles were sampled for macroinvertebrate numbers, weights, diversity, and distribution of species. Fish were sampled by electrofishing and the total standing crop in weight of each size class was calculated. Tests indicated that gross primary productivity was not stimulated by the nutrient addition; biomass of primary producers remained high, while macroinvertebrates and fish were relatively sparse downstream; macroinvertebrate diversity remained unchanged below the gross enrichment; and habitat diversity increased. The study indicated that nutrient enrichment could stimulate productivity and decrease consumer efficiencies. (Holoman-Battelle) W74-01499

POPULATION DYNAMICS OF POND ZOOPLANKTON, I. DIAPTOMUS PALLIDUS HERRICK, Kansas Univ., Lawrence. Div. of Biological

Sciences. K. B. Armitage, B. Saxena, and E. E. Angino.

Hydrobiologia, Vol 42, Nos 2/3, p 295-333, August 15, 1973, 1 fig. 10 tab. 75 ref.

Descriptors: Environmental effects, *Kansas, *Zooplankton, *Statistical methods, Life cycles, *Weather, Growth stages, Computer programs, Fecundity, Secondary productivity, Life history studies, Copepods, Water analysis, Reproduction, Nutrients, Surface waters, Water sampling, Invertebrates, Chemical analysis, Bottom sampling, Aquatic plants, Freshwater fish, Animal popula-tions, Water chemistry, Ponds, Crustaceans, Water temperature.

Identifiers: *Diaptomus pallidus, *Population dynamics, Gage Pond (Kan), Population density, Data interpretation, Correlation coefficients, Clarke-Bumpus sampler, Sample preservation, Copepodids, Calanoida, Macroinvertebrates, Chlorophyll a, Nais, Elodea, Notropis, Ictalurus punctatus, Micropterus salmoides, cyanellus, Largemouth bass, Green sunfish, Sil-

The simultaneous and lag relationships between 27 environmental variables and seven population components of a perennial calanoid copepod were examined by simple and partial correlations and stepwise regression. The analyses consistently explained more than 70 percent of the variation of a population component. The multiple correlation coefficient (R) usually was highest in no lag or in 3week or 4-week lag except for clutch size in which R was highest in 1-week lag. Population control, egg-bearing, and clutch size were affected primarily by enivronmental components categorized as weather; food apparently was relatively minor in affecting population control or reproduction.
(Holoman-Battelle) W74-01502

CHANGES IN SPECIES COMPOSITION OF PHYTOPLANKTON DUE TO ENRICHMENT BY N, P, AND SI OF WATER FROM A NORTH FLORIDA LAKE,

Florida State Univ., Tallahassee. Dept. of Oceanography. W. A. Gloosechenko, and C. Alvis.

Hydrobiologia, Vol 42, Nos 2-3, p 285-294, August 15, 1973, 4 tab, 18 ref.

*Phytoplankton, Nutrients. Nitrogen, *Phosphorus, Cyanophyta, Chrysophyta, Pyrrophyta, Chlorophyta, Water sampling, Aquatic algae, Chlorella, Diatoms, Dinoflagellates, Speciation, Biological communities, Water pollution effects, Eutrophication, Seasonal, Cultures, *Florida.

Identifiers: *Lake Jackson (Fla), *Nutrient enrichment, Silicon, Enrichment, Enumeration, Anacystis cyanea, Cosmarium, Lyngbya, Microspora, Desmids, Oedogonium, Oscillatora, Navicula, Aphanizomenon flos-aquae, Botryococ-cus braunii. Ceratium hirundinella. Hyalotheca muscosa, Nitzschia palea, Pediastrum duplex, Phormidium tenue, Scenedesmus obliquus, Spon-dylosium planum, Staurastrum paradoxum, Staurastrum pentacerum, Uronema elongatum, Anabaena flos-aquae, Ankistrodesmus falcatus, Asterionella formosa, Dinobryon divergens.

Water samples were collected from Lake Jackson, near Tallahassee, Florada, and enriched with N. P. N plus P, and Si in the laboratory in April, 19 and January, 1970. After time intervals of 3 and 6 days in April, and 13 days additionally in January, phytoplanktonic algae in the cultures were enu-merated as to species composition and cell num-bers with an inverted plankton microscope. Controls, to which no nutrients were added, were also maintained to determine changes rising from culture-room conditions. The addition of N and P, alone or in combination, caused increased num-bers of algae, along with differences in species composition. This indicated that these two nutrient elements were limiting to production in Lake Jackson besides exerting a chemical control on

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Effects of Pollution—Group 5C

succession. Si additions increased diatom numbers, but also stimulated Anacystis cyanea to grow in the April sample. Species attributed as indicators of organic pollution were found to be simulated by inorganic sources of N, P, or Si. Such changes indicated caution must be exercised in interpreting long-term nutrient enrichment experiments using natural phytoplnakton communities. (Holoman-Battelle) W74-01503

THE STRUCTURE OF AN ACID MOORLAND

POND COMMUNITY, University Coll. of South Wales and Monmouthshire, Cardiff. Dept. of Zoology. D. Griffiths.

Journal of Animal Ecology, Vol 42, No 2, p 263-283, June 1973. 7 fig, 11 tab, 26 ref, append.

Descriptors: *Biological communities, *Aquatic plants, *Aquatic animals, *Spatial distribution, Invertebrates, Aquatic insects, Newts, Ecological distribution, Mollusks, Distribution patterns, distribution, Mollusks, Distribution patterns, Crustaceans, Nematodes, Annelids, Ponds, Bot-Crustaceans, Menatodes, Annenas, Ponds, Bottom sampling, Methodology, Speciation, Amphibians, Pondweeds, Mosses, Clams, Biomass, Standing crops, Diptera, Midges, Caddisflies, Oligochaetes, Waterfleas, Mites. Identifiers: *Acid moorland, *United Kingdom (Pen-ffordd-goch Pond), Macroinvertebrates,

Bugs, Juncus, Potamogeton, Glyceria, Sphagnum, Glyceria fluitans, Potamogeton polygonifolius, Jancus bulbosus, Juncus effusus, Data interpretation, Chironomids, Alderflies, Ostracods, shrimp, Water boatmen, Water mites, Rushes, Sample preservation, Aeshna, Pyrrhosoma, Notonecta, Sigara, Glaenocorisa, Corixa, Phryganea, Limnephilus spp, Hydrozetes, Cypria, Chydorus, Alona, Ilyocryptus, Cyclops gracilis, Cyclops bicolor, Tripyla.

An investigation was made of the spatial relations between the plants and animals comprising an acid moorland pond community. Samples of plants and animals were taken from Pen-ffordd-goch Pond in animas were taken from rentrol and good assigned to enclose a vertaical column of water and the surface layer of the substratum. On collection, the samples, consisting of a mixture of mud, plant material and animals, were preserved in Pampel's fluid and sorted in two operations, a purely physical sorting followed by chemical separation. Of the plant species Juncus and Potamogeton were found in the shallow water and Glyceria in the deeper water. There was no obvious difference in the fauna of the two zones and no sharp change in faunal composition corresponding with the floral change. All the animals, except Sialis, has aggregated distributions. This was due to environmental heterogeneity, some areas being more suitable for a species than others. An inverse relationship between the abundances of the animals (in terms of biomass) and the degree of aggregation was demonstrated for the animals from each zone. The associations between plants, plants and animals, and between animals were measured by a rank correlation coefficient. In the Glyceria zone the majority of the animals were associated with the plants. In the Juncus-Potamogeton zone the majority of the animals were associated with the Sphagnum/debris/Juncus complex. Species abundances are compared with various models, the best fit being given by the geometric series. The species size distribution is approximately lognormal. The majority of the animals in the pond were feeding on detritus, very little living vegetation being eaten. (Holoman-Battelle) W74-01508

ALGAL EXCRETION OF C-14-LABELED COM-POUNDS AND MICROBIAL INTERACTIONS IN CYANIDIUM CALDARIUM MATS, Wisconsin Univ., Madison. Dept. of Bacteriology. R. T. Belly, M. R. Tansey, and T. D. Brock. Journal of Phycology, Vol 9, No 2, p 123-127, June 1973. 4 fig, 23 ref. Descriptors: *Bioassay, *Bacteria, *Fungi, *Algae, *Bicarbonates, Ecology, Absorption, Proteins, Water temperature, Light, Hydrogen ion concentration, Chlorophyll, Aquatic populations, Biomass, Cultures, Photosynthesis, Laboratory tests. On-site tests.

Identifiers: Excretion, *Cyanidium caldarium, Bacillus coagulans, Dactylaria gallopova.

Because of their low species diversity in hot acid waters, Cyanidium caldarium was used to study bacterial, fungal, and algal interactions in aquatic habitats. Field and laboratory studies included quantification of bacteria, algae, and fungi, deter-mination of protein and chlorophyll content, uptake of C-14-labeled NaHCO3 and excretion of extracellular products. The primary bacterial com-ponent of C. caldarium mats is Bacillus coagulans, and the primary fungal component is Dactylaria gallopava. The studies showed that from 2 to 6 per-cent of the NaHC-14O3 taken up by natural or laboratory populations of the alga was excreted as C-14 labeled materials. However, when excretion was expressed as a percentage of NaHC-14O3 uptake, a higher percentage of the radioactivity w excreted at nonoptimal conditions for NaHC-14O3 uptake. Fungal biomass was directly proportional to algal density, but bacterial numbers varied widely and did not correlate with algal numbers. The bacterial and fungal components could be grown in mixed culture with either growing C. cal-darium cultures or in an extract prepared by heat-ing algal cells. (Little-Battelle) W74-01510

MECHANISM OF NTA DEGRADATION BY A BACTERIAL MUTANT,

Department of the Environment, Burlington (Ontario). Centre for Inland Waters. For primary bibliographic entry see Field 05B. W74-01515

GROWTH AND BUOYANCY OF MICRO-CYSTIS AERUGINOSA KUTZ. EMEND. ELEN-KIN IN A SHALLOW EUTROPHIC LAKE, Freshwater Biological Association, Shrewsbury

(England). C. S. Reynolds.

Proceedings of the Royal Society of London, Series B, Vol 184, No 1074, p 29-50, August 31, 1973. 9 fig, 2 tab, 31 ref.

Descriptors: *Cyanophyta, *Aquatic algae, *Eutrophication, *Lakes, *Plant growth, *Buoyancy, Shallow water, Nutrients, Primary productivity, Plant populations, Thermal stratifi-cation, Seasonal, Water temperature, Oxygen, Water sampling, Nitrates, Chemical analysis, Water analysis, Standing crops, Trophic level. Identifiers: *Microcystis aeruginosa, Survival, Orthophosphates, Vertical distribution, Enumera-

The growth of Microcystis aeruginosa in a small, shallow eutrophic lake was studied during three consecutive seasons. Standard measurements of temperature, oxygen concentration, and underwater light attenuation were made at weekly intervals. Water samples were analyzed for orthophosphate and nitrate concentrations. Quantitative plankton samples were collected using a 5m column and population density was estimated by the iodine-sedimentation technique of Lund. Le Crew and Kipling (1958). Liter sedimented samples were used to obtain significant numbers of Microcystis colonies and to determine vertical distribution of the alga. The alga was shown to be continuously present in the plankton throughout the period. Exponential increase in the population was confined to a 5 to 8-week period, following the onset of thermal stratification. Populations ap-peared to originate near the bottom of the euphotic zone. The possession of an effective light-dependent buoyancy mechanism enabled the alga to maintain station, though progressive deterioration of the photic conditions forced populations to rise and become dissipated within epilimnion. Buoyancy increased after the cessation of growth; surface blooms often led to the physical removal of a majority of colonies to lee shores. Surviving colonies became generally less buoyant after the lake destratified in autumn. (Holoman-Battelle)

CONCENTRATIONS OF SOME TRACE METALS IN PELAGIC ORGANISMS AND OF MERCURY IN NORTHEAST ATLANTIC OCEAN WATER,

Southampton Univ. (England). Dept. of Oceanog-

T. M. Leatherland, J. D. Burton, F. Culkin, M. J. McCartney, and R. J. Morris.

Deep-Sea Research and Oceanographic Abstracts, Vol 20, No 2, p 679-685, August 1973. 1 fig, 3 tab,

Descriptors: Zooplankton, *Zinc, *Mercury, *Neutron activation analysis, Marine fish, *Cad-mium, Water analysis, Sea water, Trophic level, Separation techniques, Invertebrates, Copepods, Shrimp, Sharks, Jelly fish, "Trace elements. Identifiers: "Antimony, "Arsenic, Gas-liquid chromatography, Sample preparation, Electron capture detectors, Methylmercury, Bioaccumulation, Freeze drying, Biological samples, Sample preservation, Tunicates, Decapods, Krill shrimp, Needlefish, Mysids.

Zooplankton and fish, representing different trophic levels, and water were collected mainly from the Northeast Atlantic Ocean for analysis of Sb, As, Cd, Hg, and Zn by neutron activation analysis. Water samples were collected in a plastic bucket and in propylene water bottles, acidified with HC1, and stored in polyethylene bottles. Some organisms were freeze dried, irradiated, digested in sulfuric acid and hydrogen peroxide, and glycine and perchloric acid added to distill the Hg. After the distillate was removed, hydrochloric and hydrobromic acids were added to the main solution, and Sb and As distilled at about 200C and separated by sulfide precipitation. Zn and Cd present in the residual solution were separated by anion exchange of their chloro-complexes. The separated elements were radiochemically purified and converted to suitable forms for gravimetric measurement of chemical yield and counting of beta particles. Other samples were frozen, homogenized, extracted with benzene, back ex-tracted with cysteine acetate solution, and examined by gas-liquid chromatography using an electron capture detector. Concentrations of mer-cury (0.06 to 0.38 ppm dry weight) showed no clear trend with trophic level. Organomercury analyses on two species showed that the element was present largely in the methylmercuric form. Concentrations of cadmium, which reached 13 ppm dry weight in Systellaspis debilis and Oplophorus sp., and of arsenic, which averaged 25 ppm dry weight in the crustaceans, tended to decrease in the tissues of fishes. Values for antimony which were all below 0.1 ppm dry weight, showed some indication of a similar trend. Concentrations of mercury in seawater from an adjacent area ranged from 17 to 142 mg/l., the highest concentration oc-curring in deep water. (Little-Battelle) W74-01523

THE SENSITIVITY OF SUPPRESSED AND UN-SUPPRESSED LON STRAINS OF ESCHERICHIA COLI TO CHEMICAL AGENTS WITH INDUCE FILAMENTATION, Middlesex Hospital Medical School, London (En-

gland).
R. James, and N. E. Gillies.
Journal of General Microbiology, Vol 76, No 2, p
429-436, June 1973. 5 fig, 1 tab, 32 ref.

Descriptors: *Toxicity, *E. coli, *Cultures, Varieties, *Organic pesticides, Bioassay, Dyes, Antibiotics (Pesticides), Viability, Genetics.

Group 5C-Effects of Pollution

Identifiers: Nalidixic acid, Gentian violet, Crystal violet, *Penicillin, Sensitivity, Bacterial physiology, Mutants, Organic dyes, Survival, Benzylpenicillin.

The sensitivities of lon strains of Escherichia coli to the filament inducing agents nalidixic acid, gen-tian violet, crystal violet and penicillin were ex-amined. The strains used included those in which the lon gene is suppressed by sul, exr, and rec as well as strains in which the Lon phenotype is expressed. The sensitivity of the bacteria to agents which act on DNA was reduced when lon was suppressed, but the extent of the decrease in sensitivity was dependent on the mechanism by which suppression was effected. Sensitivity to penicillin, on the other hand, was reduced only in the sul strain and by a mechanism which appears to be independent of the direct suppression of lon. A model to account for these results indicates possible sites at which the lon, sul, exrA and recA genes are expressed. (Little-Battelle) W74-01524

THE EFFECT OF ALDRIN ON WATER BALANCE IN THE FRESHWATER PUL-MONATE GASTROPOD (BIOMPHALARIA

GLABRATA),
Agricultural Research Council, Brighton (England). Unit of Invertebrate Chemistry and Physiology.

Environmental Pollution, Vol 5, No 2, p 149-151, September 1973, 2 tab. 2 ref.

Descriptors: *Aldrin, *DDT, *Bioassay, Water pollution effects, Water balance, Insecticides, Animal physiology, Path of pollutants, Pesticide toxicity, Membrane processes, Aquatic animals, Snails, Gastropods, Mollusks, Chlorinated hudrocarbon pesticides, Carbamate pesticides, Phosphothioate pesticides, Animal pathology, Invertebrates, Laboratory tests, Absorption.

Identifiers: *Biomphalaria glabrata, *Orb snails, *Carbaryl. *Malathion. Macroinvertebrates. *Carbaryl, *M Bioaccumulation

Biomphalaria glabrata were kept for 24 h at 26 C in colloidal solutions of aldrin, carbaryl, DDT and malathion in Ringer's containing 0.5 percent gelatine. All four pesticides affected the heart rate and were lethal in 24 h. Of the four pesticides aldrin caused a progressive accumulation of body water over the range tested. At the higher aldrin levels this accumulation resulted in a body water content of 70 percent more than that found in the untreated control animals. Only in the case of aldrin was the impairment of osmoregulation seen, resulting in the accumulation of body water. The swelling was seen during the first few hours of exposure before major decreases in heart beat were produced. On examination of the distended snails, the haemolymph spaces were found to be swollen with fluid. Aldrin appears to interfere with osmoregulation, causing accumulation of fluid in the haemolymph. Whether this fluid accumulates by inhibition of diuresis by the Malpighian tubules, or by increase in water permeability of the body wall, remains to be investigated. (Holoman-Battelle) W74-01525

THE EFFECT OF CHINA-CLAY WASTES ON STREAM INVERTEBRATES,

Cornwall River Authority, Launceston (England). P. M. Nuttall, and G. H. Bielby. Environmental Pollution, Vol 5, No 2, p 77-86, September 1973. 2 fig., 4 tab, 22 ref.

Descriptors: *Invertebrates, *Water pollution effects, "Natural streams, "Aquatic plants," Water quality, Suspended solids, Aquatic algae, Annelids, Mollusks, Crustaceans, Aquatic insects, Aquatic animals, Industrial wastes, Mosses, Chlorophyta, Benthic fauna, Benthic flora, Tubificids, Water sampling, Pondweeds, Submerged plants, Clams, Snails, Water beetles, Dragonflies, Isopods, Amphipoda, Stoneflies, Mayflies, Cad-

Identifiers: *China clay wastes, Macroinver-tebrates, Macrophytes, Water mites, Pond snails, Species abundance, Turbellaria, Sample preservation, Myriophyllum, Ranunculus, Fontinalis, Mougeotia, Crowfoots, Stigeoclonium, Plym River, Yealm River, Tory Brook River, East Looe River, Fowey River, Fal River, St. Austell River, Crinnis River, Par River, Black flies, Horse flies, Soldier flies, Crane flies, Predaceous diving beetles, Riffle beetles, Whirligig beetles, Common skinners, Flatworms, Leeches, Dance flies.

A survey of the macro-invertebrate fauna of rivers receiving china-clay wastes was carried out during 1971-72. A total of 59 samples were taken from 44 sites with a closed triangular net (64 mesh/sq cm) at the riffle sections of the rivers sampled. Samples were preserved in 4 percent formalin for further processing in the laboratory. Rivers polluted by clay waste supported a sparse population of few species. Rooted vegetation was absent, although clean headstreams and unpolluted reaches supported a rich community of aquatic plants. Control streams supported thirty-six times the density of animals found at clay-polluted stations. The composition of species was greater in unpolluted rivers, moorland headstreams and at stations downstream of sewage outfalls compared with clay-polluted reaches. Baetis rhodanii, Perlodes microcephala and the burrowing forms Tu-bificidae, Naididae and Choronomidae were in greater abundance in clay-polluted reaches. China-clay pollution either eliminated or reduced the abundance of several species frequent in control streams. The poor incidence of plants and macroinvertebrates from rivers receiving china-clay waste was associated with the depositon of fine inert solids derived from the clay extraction process rather than turbidity or abrasion caused by particles in suspension. (Holoman-Battelle) W74-01527

PARTICULATE METALS IN WATERS OF SORFJORD WEST NORWAY, Edinburgh Univ. (Scotland). Grant Inst. of Geolo-

or primary bibliographic entry see Field 05B. W74-01528

GROWTH RATES OF SEDIMENT-LIVING MARINE PROTOZOAN AS A TOXICITY INDICATOR FOR HEAVY METALS, Leeds Univ. (England). Wellcome Marine Lab. For primary bibliographic entry see Field 05A. W74-01529

DISTRIBUTION OF (C-14) PCBS IN CARP, Tokyo Univ. of Fisheries (Japan). T. Yoshida, F. Takashima, and T. Watanabe. AMBIO, Vol 2, No 4, p 111-113, 1973. 2 fig, 1 tab, 11 ref.

Descriptors: *Polychlorinated biphenyls, *Distribution patterns, *Radiochemical analysis, *Carp, *Bioassay, Radioactivity techniques, Absorption, Freshwater fish, Animal metabolism. solption, Frieswater Hay, Amman Meadoushin, Identifiers: "Scintillation counting, Biological samples, Chlorinated hydrocarbons, Bioaccumulation, Gall bladder, Hepatopancreas, Kidneys, Adipose tissue, Brain, Heart, Blood, Gills, Intestine, Skin, Muscle, Tissue.

Young carp (Cyprinus carpio) were exposed to C-14-labeled PCB's by oral dosage and by addition to water to determine the distribution of PCB's in fish. The PCB's used were nearly equivalent to Aroclor 1248. Oral dosage was 6 microcuries of C-14 PCB per fish. In the water exposure experiment, fish were exposed to 2 microcuries per liter for 24 hours. After dosing, the fish were kept in a flowing water tank and fed a PCB-free diet for 7 days to equilibrate the distribution in the fish body. Two fish from each experiment were disd and the amount of radioactive material in the hepatopancreas, gall bladder, kidney, visceral adipose tissue, adipose tissue of the skull, brain, heart, blood, gill, intestine, skin, and dark and white muscle was determined using an automatic sample oxidizer and liquid scintillation counter. Autoradiographic analysis of whole bodies was used for the remaining samples. The compounds were localized mainly in the gall bladder, adipose tissue and hepatopancreas, but only slight radioactivity was detected in muscle, with the exception ark muscle. In particular, high radioactivity was detected in the gall bladder and adipose tissue of the skull. In the feeding experiment, a higher radioactivity count was observed in the intestine, especially in the posterior segment. (Little-Bat-telle) W74-01530

STUDIES ON METHANOL-OXIDIZING BAC-TERIA. I. ISOLATION AND GROWTH STU-

Texas Univ., Austin. Dept. of Microbiology. R. J. Mehta.

Antonie van Leeuwenhoek, Vol 39, No 2, p 295-302, 1973, 7 tab. 16 ref.

Descriptors: *Isolation, *Methane bacteria, *Pollutant identification, *Oxidation, Soil bacteria, Assay, Enzymes, Metabolism, Methane, Water pol-

say, Enzymes, Metabolism, Methane, Water pol-lution sources, Cultures, Inhibition, Pseu-domonas, Manometers, Temperature, Organic compounds, Alcohols, Amino acids, Microbial degradation, Aerobic bacteria. Identifiers: *Bacterial physiology, *Substrate utilization, *Growth studies, *Methanol, Cya-nides, Pseudomonas spp, Enzymatic inhibitors, Formate dehydrogenase, Manometric techniques, Enrichment, Carbon sources, Substrate consen-Enrichment, Carbon sources, Substrate concentration, Glutamates, Acetates, Citrates, Succinates, Lactates, Oxalates, Glycollates, Formates, Cyanides, Sample preparation, Cell yield, Ethanol, n-Propanol, n-Butanol, Isopropanol, Methylamine, Glycine, Serine, Alanine, Glucose, Fructose, Formaldehyde,

Three methanol-oxidizing bacteria were isolated by enrichment culture technique from soil. Two of them were Pseudomonas spp. The third one was obligate methylotroph. The growth characteristics of the 3 microbes were studied in cultures containing a basal salts medium and an appropriate carbon source. Oxygen uptake by washed-cell suspen-sions or crude cell extracts was measured in conventional Warbury manometers at 30 C with air as the gas phase. Formate dehydrogenase activity was assayed by measuring the rate of CO2 production by a conventional manometric technique. Cell-suspension experiments with Pseudomonas RJ suggest that methanol-, formaldehyde-, and formate-oxidizing enzymes were present. Formate-oxidizing enzyme was detected only from Pseudomonas RJ. It had a pH optimum of 7.0 and required nicotinamide adenine dinucleotide (NAD) for activity. Cyanide at 0.01 mM concentration inhibited the enzyme activity completely. (Holoman-Battelle) W74-01535

VIABILITY OF LYOPHILIZED MICROORGAN-

ISMS AFTER STORAGE, Agricultural Univ., Wageningen (Netherlands). Lab. of Microbiology.

J. Antheunisse. Antonie van Leeuwenhoek, Vol 39, No 2, p 243-248, 1973. 2 tab, 8 ref.

*Bacteria, Descriptors: *Vensts Storage, Effects, Pathogenic bacteria, Microorganisms, Pseudomonas, Azotobacter, Aerobic bacteria, Nitrogen fixing bacteria.

*Lyophilization, *Survival. Identifiers: Heterotrophic bacteria, Culture media, Agrobacterium, Beijerinckia, Erwinia, Lipomyces, Microcyclus, Arthrobacter, Brevibacterium, Escherichia, Corynebacterium, Mycobacterium, Rhizobium, Bacillus, Acetobacter, Alcaligenes, Azotobacter agilis, Azotobacter beijerinckii, Azotobacter chroeococum, Azotobacter vinelan-dii, Brevibacterium linens, Caulobacter, Cellulomonas, Lactobacillus, Leuconostoc, Micrococcus, Mycobacterium, Mycobacterium phlei, Mycobacterium rhodochrous.

Bacteria, yeasts and fungi lyophilized in a dextransodium glutaminate solution were stored under vacuum in the dark at room temperature. After 6 years the survival was tested and viability counts vere made. Of the 48 genera or groups tested 31 survived well and 9 moderately (respectively, 80-100 percent and 50-80 percent of the strains were still alive). Many strains of the genera Agrobacterium: Azotobacter: Beijerinckia: Erwinia: Pseudomonas; Lipomyces and Microcyclus failed to survive. Lyophilized mushroom mycelium did not grow after 6 years storage. The results of this ex-periment are compared with those obtained with the same strains preserved on sealed agar slants (Antheunisse, 1972). The results of both methods in relation to some genera are discussed. (Holoman-Battelle) W74-01538

MICROFAUNA OF ACTIVATED SLUDGE. PART III. THE EFFECT OF PHYSICO-CHEM-ICAL FACTORS ON THE OCCURRENCE OF MICROFAUNA IN THE ANNUAL CYCLE. Instytut Gospodarki Kommunalnej, Warsaw (Poland). Pracownia Hydrobiol.

H. Klimowicz.

Acta Hydrobiologica. Cracow, Vol 15, No 2, p 167-188, 1973. 6 fig, 1 tab, 20 ref.

Descriptors: *Activated sludge, *Physicochemical properties, Pollutant identification, *Environmenproperties, Pollutant identification, "Environmental effects, Domestic sewage, Sewage effluents, Protozoa, Rotifers, Crustaceans, Nematodes, Oligochaetes, Temporal distribution, Dominatorganisms, Chemical analysis, Nitrates, Nitrites, Ammonia, Suspended solids, Dissolved oxygen,

Air temperature, Hydrogen ion concentration, Biochemical oxygen demand, sampling. Identifiers: *Sewage microorganisms, *Annual cycles, *Seasonal variation, Characterization, Tardigrades, Gastrotricha, Influents, Organic nitrogen, Flagellates, Arachnids, Amoeba limax, Amoeba proteus, Amoeba gorgenia, Amoeba radiosa, Cochliopodium granulatum, Arcella vulradiosa, Cochiopodium granulatum, Arceila vui-garis, Euglypha alveolata, Peranema trichophorum, Coleps hirtus, Trachelophyllum pusillum, Litonotus carinatus, Litonotus crinitus, Litonotus fasciola, Chilodonella cucullulus, Chilodonella uncinata, Colpidium campylum Urostyla.

Studies were conducted over a 1-yr period to determine the effect of physiochemical and atmospheric conditions on the development of microfauna in the annual cycle in activated sluge. One hundred and four activated sludge samples were examined immediately after being taken from a Sheffield type aeration tank which receives domestic sewage. Faunistic analyses and the following physiochemical observations were made: concentration and volume of the activated sludge in the aeration tank, temperature of air and sludge, concentration of DO, pH of inflowing and effluer sewage, 5-day BOD, and the amount of suspended solids, ammonia, organic nitrogen, nitrates, and nitrites in the inflowing and effluent sewage. 69 species of microorganisms were identified. It was difficult to determine which fluctuations in the assemblage of the microfauna depended on the technological and which on the atmospheric conditions. The majority of species in the activated sludge appear accidentally in periods which are difficult in anticipate. The remaining species may be divided into frequently and rarely found in the course of the year, and into those characteristic for warm or cold seasons of the year. The rise in temperature from March to September caused a al increase in the number of species and the fall in temperature in the cold season an increase in the number of individuals. The number of species and of the individuals representing them de pends mainly on the course of the process of sewage purification and to a lesser degree on the season of the year. (See also W72-05732) (Holoman-Battelle) W74-01542

THE CHEMICAL OXYGEN DEMAND OF WATERS AND BIOLOGICAL MATERIALS FROM PONDS,

Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.

Transactions of the American Fisheries Society. Vol 102, No 3, p 606-611, July 1973. 6 fig, 12 ref.

Descriptors: *Chemical oxygen demand, Surface waters, "Ponds, "Aquatic algae, Aquatic plants, "Freshwater fish, "Organic matter, Oxidation, Phytoplankton, Aquatic bacteria, Water analysis, Chemical analysis, Oxygen, Water temperature, Euglena, Chlamydomonas, Zooplankton, Chlorophyll, Primary productivity, Water hyacinth, Pondweeds, Carp, Channel catfish, Dissolved oxygen, Water sampling, Alligatorweed.
Identifiers: *Oxygen consumption, Macrophytes, Particulate matter, Sample preparation, Aphanizomenon flos-aquae, Anabaena circinalis, Staurastrum, Nitella, Spirogyra, Elodea densa, Water milfoil, Threadfin shad, Gizzard shad, Stoneworts, Duckweed, Largemouth bass, Duckweed, Largemouth bass, Stoneworts, Duckweed, Largemouth bass, Bluegills, Wild celery, Spike rushes, Needle rush, White catfish, Scenedesmus dimorphus, Anabaena flos-aquae, Chlorella pyrenoidosa, Ankistrodesmus falcatus, Coelastrum Ankistrodesmus falcatus, Coelastrum microporum, Pithophora kewensis, Alternanthera philoxeroides, Lemna minor, Eichhornia cras-

Water samples were taken from ponds which received feed applications and from fertilized and unfertilized ponds and analyzed to determine if a consistent relationship exists between the COD of pond waters and the rate of oxygen consumption by planktonic organisms. The samples were collected 10 cm beneath the surface with polyethylene bottles and used within 2 hr of collection for the preparation of the following experi-ments: rate of O2 consumption, COD, and effect of temperature on O2 consumtion. COD determinations were made on unfiltered and the filtrates of filtered water samples. The total amount of O2 required to oxidize fish, algal, and macrophyte samples was determined by COD analysis. The rate of oxygen consumption by organisms in pond waters, as measured by a dark bottle technique for a 24-hr period, increased with increasing chemical oxygen demand (COD). Rate of oxygen consumption increased with temperature between 15 and 35C (Q sub 10 values were 1.5 to 2.0). At the same level of COD, oxygen consumption was greater in unaltered pond water than in water in which the plankton was heat-killed and oxygen was utilized only by bacteria and other decomposers. COD was positively correlated with increasing concentrations of chlorophyll in pond water. The amount of COD in soluble organic matter ranged from 20.2 to 95.0 percent of the total COD. The percentage of the COD in the soluble fraction decreased with increasing quantities of phytoplankton. The average amounts of oxygen pnytoplankton. The average amounts of oxygen (mg oxygen/mg dry wt) required to completely oxidize various types of biological material were: phytoplankton from pure cultures, 1.29; macroscopic algae, 100; higher aquatic plants, 0.99; particulate matter from pond waters 0.98; and fish, 1.19. (Holoman-Battelle) W74-01543 MICROBIAL FLORA AND LEVEL OF VIBRIO PARAHAEMOLYTICUS OF OYSTERS (CRAS-SOSTREA VIRGINICA), WATER AND SEDI-MENT FROM GALVESTON BAY,
Texas A and M Univ., College Station. Dept. of
Animal Science.

C. Vanderzant, C. A. Thompson, Jr., and S. M.

Ray.

Journal of Mi'k and Food Technology, Vol 36, No 9, p 447-452, September 1973. 4 fig, 5 tab, 33 ref.

Descriptors: "Oyz'ers, "Pathogenic bacteria, "En-teric bacteria, Water pollution, "Bottom sedi-ments, "Pollutant identification, Shellfish, Cultures, Iosolation, Dominant organisms, Ecological distribution, Path of pollutants, Aerobic bacteria, Anaerobic bacteria, Fish parasites, Aquatic soils, Soil contamination, Pseudomonas, Soil analysis, Water analysis, Pollutants, Water temperature,

Identifiers: *Vibrio parahaemolyticus, Heterotrophic bacteria, Culture media, Plate counts, *Galveston Bay, Aeromonas, Moraxella, Acinetobacter, Flavobacterium, Achromobacter, Bacillus, Micrococcus, Staphylococcus, En-terobacteriaceae, Animal tissues, Biochemical tests, Sample preparation, Trypticase soy broth, Trypticase soy agar, Thoisulfate citrate bile salts

Ovsters taken from Galveston Bay were examined within 6-12 hr after collection in order to obtain some information on the level and type of microbial flora and the distribution of V. parahaemolyticus in oysters, water, and sediment. The shucked oysters were blended and bacterial counts were determined by the spread plate method using trypticase soy agar plates with 3 percent NaC1. Isolation of V. parahaemolyticus was accomplished using oyster-trypticase-peptone homogenate in trypticase soy broth with 7 percent NaCl and subsequently on thiosulfate citrate bile salts surcrose agar plates. MT plates were also used without enrichment for isolations. Aerobic plate counts at 25 C of reshly harvested oysters ranged from 23,000 to 30 million and those of sediment samples from less than 100 to 3 million/g. Counts of water samples were nearly always less than 100/ml. Vibrio, Aeromonas, and Moraxella species predominated in the fresh oysters. Vibrio parahaemolyticus was isolated from 39 to 66 oyster samples and from 9 of 30 sediment and water samples. Isolation was most effective with prior enrichment of samples in trypticase soy broth with 7 percent NaCl and subsequent plating on theiosulfate citrate bile salts sucrose agar. V. parahaemolyticus was detected in only 1 of 8 refrigerated retail oyster samples. Aerobic plate counts at 25 C of refrigerated retail oysters were not much different from those of similar lost cked under aseptic conditions in the laboratory (Bbefore shucking and washing in the plants). Aeromonas and Moraxella species were predominant in oysters at the retail level. (Holoman-Battelle) W74-01548

SENSITIVITY OF THREE SELECTED BAC-TERIAL SPECIES TO OZONE,
Brooke Army Medical Center, Fort Sam Houston,
Tex. Health Care Research Div.
For primary bibliographic entry see Field 05F. W74-01553

BIODEGRADATION OF PHENYLMERCURIC ACETATE BY MERCURY-RESISTANT BAC-TERIA, Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-01555

THE PLANKTONIC ASSOCIATION (CLADOCERA AND COPEPODA) OF A DIMIC-

Group 5C-Effects of Pollution

TIC LAKE OF THE LAURENTIDES PARK, QUEBEC, (IN FRENCH), Laval Univ., Quebec. For primary bibliographic entry see Field 02H. W74-01558

INCREASE OF RESISTANCE OF CARP TO DROPSY BY MEANS OF BREEDING. II. COURSE OF SELECTION AND EVALUATION OF THE BREED GROUPS, (IN RUSSIAN), Gosudarstvennyi Nauchno-Issledovatelskii In-

stitut Ozernogo i Rechnogo Rybnogo Khozyaistva, Leningrad (USSR).

V. S. Kirpichnikov, and K. A. Faktorovich Genetika. Vol 8, No 5, p 44-54. 1972. Illus. (English summary).

Identifiers: Breeding, *Carp, *Dropsy, Genes, Genomes, Growth, Hybrids, Pools, Selection, Strains, *USSR (Krasnodar Territory).

The breeding of carp for the resistance to dropsy in the Krasnodar Territory (USSR) was in progress for 8 yr. Breeding procedures were performed with 3 breed groups: Ropshian carps possessing a considerable proportion of genes from the gene pool of Amur wild carp in their genome, local scattered carps and the hybrids of the Ropshian and the Ukranian carps. During breeding procedures, the Ropshian carps underwent selection for dropsy resistance through 2 generations, while all the other breed groups underwent it in 1 generation. Hybrids between the Ropshian carp and the local scattered carps proved best with respect to growth rate and resistance to dropsy, while the scattered carps were the worst. Fairly good results were obtained with hybrids between the Ropshian and the Ukranian carps. The good characteristics of the inter breed hybrids suggest the urgency of future parallel breeding work with 2 or 3 breed groups with the subsequent use of the heterotic interbreed hybrids for commercial purposes.--Copyright 1973, Biological Abstracts, Inc. W74-01560

A FIRST RECORD OF RED-WATER PHENOMENON IN KASHMIR, INDIA, Kashmir Univ., Srinagar (India). Dept. of Zoology.

S. M. Das, and Nisar A. Jan. Kashmir Sci, Vol 7, No 1/2, p 45-47, 1970, Illus. Identifiers: Chromatophores, *Euglena-rubra, *India (Kashmir), Record, *Red water, Water pol-

Large expanses of freshwater both permanent and transient were observed, completely covered with a thick red mantle. These waters were devoid of all other life normally supported. The responsible or-ganism was identified as Euglena rubra. These ossess a layer of red chromatophores spread throughout the cell body. The estimated Euglena population of a 4-acre shallow water body was about 160,000,000.—Copyright 1973, Biological Abstracts, Inc. W74-01564

HYDROBIOLOGICAL STUDIES ON THE LED-NICKE RYBNIKY PONDS: SPECIES COMPOSI-TION AND SEASONAL VARIATION IN THE ABUNDANCE OF PLANKTON (IN CZECH), Brno Univ. (Czechoslovakia). Hydrobiologicka

B. Losos, and J. Hetesa.

Laborator.

Prirodoved Pr Ustavu Cesk Akad Ved Brne, Vol 5, No 10, p 3-54, 1971, Illus.

Janktonic abundance, Ponds, Seasonal, Species, Zooplankton, *Cyanophyta.

After a rather long break, hydrobiological investigations were resumed on the Lednicke ryb-niky Ponds (Southern Moravia, Czechoslovakia) during 1956-1962. Besides the structure and development of planktonic biocenoses, investigations also involved the chemical composition of water. Particular attention was paid to the differential species composition and abundance of plankton in individual ponds and in successive years; to the development and composition of blue-green algae water blooms; and to individual types of zooplankton during the growing season. The results of the above observations are compared with the data forwarded by earlier authors, and the changes that had arisen within the past 30 yr.--Copyright 1973, Biological Abstracts, Inc. W74-01567

THE RELATIONS OF PERIPHYTIC AND PLANKTONIC ALGAL GROWTH IN AN ESTUARY TO HYDROGRAPHIC FACTORS, Washington Univ., Seattle. Dept. of Civil En-

gineering. E. B. Welch, R. M. Emery, R. I. Matsuda, and W.

Limnol Oceanogr, Vol 17, No 5, p 731-737, 1972,

Identifiers: *Algal growth, Chlorophyll, Estuaries, Hydrographic studies, Light, Nitrogen, *Periphytic algae, Phosphorus, *Planktonic algae, Seasons, *Washington (Duwamish estuary).

The seasonal periodicity of periphyton growth in the Duwamish estuary (Washington), is compared with that of phytoplankton and lends support to a previous conclusion that hydrographic conditions determine the timing of phytoplankton blooms despite high concentrations of dissolved N and P. Accumulation of periphyton on substrates in-creased in June and July to around 10 microgram chlorophyll a cm-2 wk-1 and is related to incident light; conversely, phytoplankton blooms were delayed until Aug. and Sept. when hydrographic conditions were optimum for biomass accumula-tions of from 30-70 microgram chlorophyll a/l. Maximum growth of periphytic and planktonic algae occurred at the same location in the estuary. This similarity in spatial distribution is not directly related to hydrographic conditions since the periphyton algae are sessile and more resistant to washout. The water in this section of the estuary presumably contained a more adequate supply of one or more limiting nutrients than water from adjacent locations .-- Copyright 1973, Biological Abstracts. Inc. W74-01571

ECOLOGICAL IMPACT OF PESTICIDES. Cornell Univ., Ithaca, N.Y. Dept. of Entomology. D. Pimentel.

Environ Biol, Vol 72, No 2, p 1-27, 1972. Identifiers: Animals, Bird, *Ecological impact,

Fish, Insects, *Pesticides, Plants, *Environmental effects, Ecosystems.

The ecological effects of pesticides (insecticides, herbicides, and fungicides) were analyzed and an assessment made of the extent of damage to the diverse processes of the environmental life system. Some pesticides reduced some species population numbers in certain regions, altered the natural habitat under some conditions, influenced the normal behavior including learning in animals, stimulated or suppressed growth in animals and plants, increased or decreased the reproductive capacity of animals, altered the nutritional content of foods, increased the susceptibility of certain animals to disease, and were concentrated in cer-tain animals to a level 100,000 times that in the environment. The available evidence suggests that certain current pesticide usage methods have caused measurable damage to some species of birds, fishes, and beneficial insects. The full extent of damage is impossible to assess accurately because only a few (less than 1000) species of plants and animals have been studied. Although data on the detrimental effects of pesticides on the life system are spotty, there is sufficient evidence for concern about pesticide use. To avoid compounding the mistakes of the past, caution should be exercised in employing any pesticide with the following characteristics: pesticides which can be concentrated in living organisms; pesticides which can be passed from link to link in the food chain and stored in the life system; and pesticides which persist in the environment .-- Copyright 1973, Biological Abstracts, Inc. W74-01573

SWIMMING ENDURANCE AND RESISTANCE TO COPPER AND MALATHION OF BLUEGILLS TREATED BY LONG-TERM EX-POSURE TO SUBLETHAL LEVELS OF HYDROGEN SULFIDE, Minnesota Univ., St. Paul. Dept. of Entomology,

Fisheries and Wildlife.

D. Oseid, and L. L. Smith, Jr. Trans Am Fish Soc, Vol 101, No 4, p 620-625,

1972, mus.
Identifiers: *Bluegills, *Copper, Endurance, Exposure, *Hydrogen sulfide, Long-Term effects, *Malathion, Resistance, Sublethal levels, Swimming endurance.

After 126 or 148 days of exposure to H2S concentrations ranging from 0.0004 to 0.0146 mg/l, young-of-the-year bluegills were tested for swimming endurance and resistance to Cu or malathion. Swimming tests at low speeds indicated increased endurance for fish exposed to .0004 mg/l H2S, but fish exposed to higher concentrations had less endurance than the controls. In the testw conducted at higher speeds, fish in all test concentrations showed less endurance than the controls. Resistance to Cu was increased by exposure to H2S, but resistance to malathion was not affected except in the lowest test concentration. The chronic exposure to H2S reduced growth in the highest concentration, and gill irrigation rate increased with increased concentrations.--Copyright 1973, Biological Abstracts, Inc. W74-01579

THE VEGETATION OF FINDLEY LAKE BASIN,

Washington Univ., Seattle. Dept. of Botany. R. Del Moral.

Am Midland Nat. Vol 89, No 1, p 26-40. 1973, Il-

Identifiers: *Abies-Amabilis. Biological. Bryophytes, Lakes, *Tsuga-Mertensi
*Washington (Findley Lake) *Vascular plants. *Tsuga-Mertensiana,

The vascular plant vegetation of the Findley Lake Basin, King Co., Washington, is described and mapped. This pristine basin ranges in elevation from 1128 to 1350 m. The forested portions of the basin are typical of the Abies amabilis and the lower Tsuga mertensiana vegetation zones, and are divided into 3 community types. Five distinct non-forested community types occupy special edaphic situations. These include a wet meadow, a structurally more complex mesic meadow, a depauperate dry meadow, a bryophyte-dominated talus community and a shrub community. Some structural characteristics of each type are discussed. The dominance of A. amabilis increases from dry ridge tops to the mesic lower slopes of the basin. This pattern reflects differences in rates of forest development along this transect. Because it is pristine and similar to A. amabilis forests in other parts of Washington, this basin is being used in studies of productivity and mineral cycling as part of the USA IBP (International Biological Program) effort. The site should be preserved as a representative of a rapidly diminishing resource.--Copyright 1973, Biological Abstract, Inc.

METALIMNIC LAYER IN LAKE KINNERET. ISRAEL.

Kinneret Limnology Lab., Tiberias (Israel). C. Serruya. Hydrobiologia. Vol 40, No 3, p 355-359. 1972.

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Waste Treatment Processes—Group 5D

Identifiers: *Israel (Lake Kinneret), Lakes, *Metalimnic layer, *Iron, *Manganese Sulfur bacteria, Cyanophyta.

Chemical and biological investigations of Lake Kinneret showed that reducing conditions prevail-ing in summer in the metalimnion cause an early and intense denitrification process accompanied by the release of dissolved Fe and Mn. These conditions are favorable to the development of sulfobacteria and blue-green algae. The role of this layer is discussed .-- Copyright 1973, Biological Abstracts, Inc. W74-01598

DISTRIBUTION AND MORPHOLOGICAL VARIATION OF LAMPSILIS RADIATA (PELECYPODA, UNIONIDAE) IN SOME CEN-TRAL CANADIAN LAKES: A MULTIVARIATE STATISTICAL APPROACH,

Manitoba Univ., Winnipeg. Dept. of Zoology. For primary bibliographic entry see Field 02H.

A MATHEMATICAL MODEL OF PRIMARY PRODUCTIVITY AND LIMNOLOGICAL PATTERNS IN LAKE MEAD,

Arizona Univ., Tucson.

L. G. Everett.

Natural Resources System Series, Technical Report No. 13, Department of Hydrology and Water Resources, September 1972. 151 p, 46 fig, 12 tab,

Descriptors: *Primary productivity, *Mathemati-cal models, *Lake stages, *Dissolved solids, *Phytoplankton, Aquatic environment, Water quality, Colorado River, Aquatic microbiology, Pollutants, Zooplankton, Colorado River Basin, Water pollution sources, Salinity, Algae. Identifiers: *Lake Mead.

Objectives were to analyze the biotic and abiotic components of Lake Mead, and to develop methodology for diagnosing changes in biological productivity as it relates to physical and chemical changes in the aquatic system. Progressive in-creases in concentration of dissolved solids in the Colorado River, as much as 2-3 times between the Green River in Wyoming and the Imperial Dam, seem to alter plankton dynamics and the biological productivity of the river. A reliable model to pre-dict future trends is needed to support alternative developmental plans for the lower basin. Lake Mead, the largest surface water body in the basin, represents a system of wide variability in limnological conditions, requiring analysis to depict the influences of past activities and to produce a sound base for forecasting environmental effects of its development. This model shows that planktonic organisms may indicate the presence of water probelms. Macro-and micro-nutrient analyses reveal that primary productivity is not inhibited by limiting concentrations. Tested with one set of independent data, this model appears to be worthy of management utility, but while working well for Lake Mead, needs to be tested with independent data. (Muller-Arizona) W74-01630

METABOLIC EFFECTS OF DRINKING

BRACKISH WATER, Central Negev Hospital, Beersheba (Israel). G. M. Berlyne, and M. Morag.
Desalination, Vol 10, No 2, p 215-219, April 1972. 4 tab. 10 ref.

Descriptors: *Urine, *Public Health, Ureas, Descriptors: "Urine, "Public Health, Ureas, Brines, Arid Lands, Arid Climates, Saline water systems, Salinity, Water pollution effects, Potable water, Domestic water, "Human Diseases, Water quality, "Brackish water. Identifiers: "Israel (Arava Rift Valley).

Brackish water is common in arid areas, in the form of surface ponds, saline water table and saline artesian aquifer groundwaters, and saline surface streams. Such saline waters may be the only water available. Brackish water in the Arava Valley in Southern Israel has a high sulphate and magnesium content. The inhabitants who drink this water have been found to have hypocalcaemia and hyperphosphataemia suggestive of parathyroid hypofunction. They also have been found to have low urinary pH, massive urinary sulphate execution, and a compensated metabolic acidosis. It is suggested that the low urinary pH may be one of the reasons for the high incidence of uric nephrolithiasis in the region. At present potable water quality standards are in terms of concentration, without reference to the quantity of such water consumed. In view of the large volumes of fluid drunk in hot and dry climates, and of the potential deleterious effects of the salts as outlined above, standards for drinking water should be redefined in terms of daily intake of ions rather than in terms of the standards currently used.
(Muller-Arizona) 74-01632

FRESHWATER MUSSEL ECOLOGY, KEN-TUCKY LAKE, TENNESSEE, MAY 1, 1969-JUNE 15, 1972,

Tennessee Game and Fish Commission, Nashville.

P. Yokley, Jr. Available from NTIS, Springfield, Va 22151 as COM-73-10619 Price \$3.00 printed copy; \$1.45 microfiche. National Marine Fisheries Service Cooperative Project 4-46-R, 1972. 133 p, 53 fig, 22 tab, 11 ref.

Descriptors: *Ecology, *Water pollution effects, *Mussels, *Tennessee River, Correlation analysis, Ecosystems, Water pollution sources, Mercury, Sampling, Chemical analysis, Lakes, Fish populations. Growth rates. Identifiers: *Tennessee (Kentucky Lake).

A study of the ecology including species distribution, densities, growth rates, and spawning of freshwater mussels in the Tennessee River, Kentucky Lake, Tennessee has revealed significant information that can serve as a basis for measuring future changes in water quality and habitat in this 160-mile stretch of the Tennessee River below Pickwick Dam. The 5 mile freshwater mussel sanctuary immediately below Pickwick Dam has revealed that protecting a habitat can help maintain a naiad fauna against exploiting commercial uses. Data indicate that some mussel species are successfully propagating and adapting to the impounded conditions that exist along the length of the Tennessee River today. There are indications that acid water pollution has seriously damaged the mussel shells especially in the deeper areas of the mussel snells especially in the deeper areas or slower moving water. Also, some mussel popula-tions have been eliminated by pollutants in past years as indicated by dead shells along specific lengths of the river. Enough remaining small mus-sel populations still exist along the river to use as sel populations still exist along the river to use as monitoring organisms and indicators of further pollution. A commercial species, Fusconaia ebena, is abundant enough and sufficiently supported to make commercial harvesting profitable. (Woodard-USGS) W74-01641

5D. Waste Treatment Processes

RECREATIONAL REUSE OF MUNICIPAL

Texas Tech Univ., Lubbock. Water Resources Center.

W. T. Winn, Jr., D. M. Wells, and R. M. Sweazy. Available from the National Technical Informa-tion Service as PB-225 154/4, \$3.50 in paper copy, \$1.45 in microfiche. Interim Report WRC-73-1, \$1.45 in microfiche. Interim Report WRC-73-1, July 1973. 48 p, 12 fig, 2 tab, 9 ref. OWRR C-4270 (No 9043) (1). Descriptors: *Water reuse, *Waste water disposal, *Eutrophication, Chlorophyta, *Groundwater, Chrysophyta, *Algae, Nutrients, *Texas, Chrysophyta, *Algae, Nutrients, *Texas, *Recreation, Water quality. Identifiers: *Lubbock (Tex), Canyon Lakes Project (Tex), *Municipal waste water.

The second reuse of municipal wastewater for recreational purposes is becoming a reality in Lub-bock, Texas where a series of small lakes will be fed with percolated wastewater which was reused previously for irrigation. In conjunction with the city's project, Texas Tech University has constructed a model of the Canyon Lakes Project consisting of nine ponds 16 x 8 x 6 ft deep fed with percolated wastewater of comparable quality and stocked with channel catfish. Several chemical parameters of H2O quality (COD, NO3, PO4, CO2 and DO) are monitored on a frequent basic along and DO) are monitored on a frequent basic along with the daily logging of physical events in an attempt to provide the City with valuable information concerning possible problems and solutions surrounding the project. Only preliminary work has been done on the pilot scale study. Additional studies are in progress. W74-01103

WATER QUALITY EVALUATION OF RE-GIONALIZED WASTEWATER SYSTEMS, Northwestern Univ., Evanston, Ill. Dept. of Civil

Engineering.

B. J. Adams, and R. S. Gemmell.

Available from the National Technical Informa-tion Service as PB-225 167/6, \$5.50 in paper copy, ton service as 18-223 follows: \$1.45 in microfiche. Water Resources Center, University of Illinois, Urbana, Research Report No. 70, 1973. 193 p, 36 fig, 45 tab, 82 ref. OWWR A-050-ILL (1). 14-31-0001-3076.

Descriptors: *Water quality management, *Regional analysis, "fillionis, "Waste water treatment, Performance, Economics, Treatment facilities, Regional planning, Systems analysis, Stochastic processes, Simulation analysis, Model studies, Evaluation.

Identifiers: Chicago (Ill), *Regional waste water systems

A water quality evaluation of regional wastewater system centralization was undertaken to test the hypothesis that water quality improvement may result from the spatial and temporal variations of wasteloads attributed to decentralized regional systems. The evaluation employed water quality models developed for both deterministic and stochastic analyses. Each analysis considered a set of experiments which involved a determination of the water quality resulting from alternative degrees of regional wastewater aggregation. The experiments treated not only the degree of aggregation or equivalently the number of plants in the system but also the stream system length as an indicator of regional morphology and the stream-water/wastewater dilution ratio as an indicator of relative stream size. The water quality assessment was made in terms of the minimum dissolved oxygen level experienced by the system. With a water quality evaluation of regional wastewater system centralization completed, an economic evaluation was undertaken. Cost functions for regional wastewater system components were developed, and costs of the physical systems hypothesized in the water quality analyses were estimated with these cost functions. Finally, a comparison was made between the water quality ct of various regional wastewater systems and the economic inpact of these systems. It was concluded that substantial benefits, both economic and water quality, may result from decentralized regional wastewater systems. W74-01107

EVALUATION OF THE BIO-DISC TREAT-MENT PROCESS FOR SUMMER CAMP APPLI-

CATION, West Virginia Univ., Morgantown. Dept. of Civil

Group 5D—Waste Treatment Processes

W. A. Sack, and S. A. Phillips.

Copy available from GPO Sup Doc as EP1.23:670-73-022, \$1.05; microfiche from NTIS as PB-225 126/2, \$1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-022, August 1973. 76 p, 30 fig, 8 tab, 9 ref. EPA Project S-800707.

Descriptors: *Waste water treatment, *Biological treatment, *Nutrient removal, Recreation facilities, *Nitrogen, *Phosphorus, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Treatment facilities.

Identifiers: *Bio-disc treatment, Process, Rotating biological contractor, Tauchtropkorper.

The bio-disc wastewater treatment process was evaluated during operation for one summer at a recreational camp. The bio-disc section consisted of four stages, each of 22 polystyrene discs 1.98 m (6.5 ft) in diameter, and was preceded by a septic tank that served to handle both the primary and the biological sludge produced. Evaluation of the plant included time required for start-up, organic removal efficiency, response to flow variations, nutrient removals, aesthetic impact, and required maintenance and operation attention. Overall organic removals reached essentially full efficiency by the end of the first week of operation. However, removals across the bio-disc section continued to increase somewhat till about the fifth or sixth week of operation. Average bio-disc unit percent removals were BOD - 84.5, COD - 71, TOC -71, and suspended solids - 75. Average overall plant percent removals were 87.5, 79, 75, and 97.5 respectively. Total nitrogen removal through the plant averaged 40.3 percent. Ammonia nitrogen removal in the disc section was only 25.2 percent. Overall total phosphorus removal was 15 percent. Maintenance and operational requirements for the plant were minimal requiring an average of 1.3 hours per week during the summer. (EPA)

REMOVAL OF PHOSPHATE AND SECONDARY B.O.D. FROM TERTIARY TREATED WASTEWATER BY AQUATIC ANIMALS,

Arizona Univ., Tucson. C. D. Ziebell.

Available from the National Technical Information Service as PB-225 210/4, \$3.50 in paper copy, \$1.45 in microfiche. Project Completion Report, August 1971. 13 p, 1 fig, 3 tab, 5 ref. OWRR A-019-ARIZ (1). 14-31-0001-3203.

Descriptors: Water pollution control, *Waste water treatment, *Municipal wastes, Phosphates, Aquatic life, Fish, Aquatic plants, Ecosystems, Waste assimilative capacity, Water reuse, Fisheries, *Biochemical oxygen demand, *Aquatic animals.

Identifiers: *Phosphate removal.

Various organisms were tested for their ability to remove the orthophosphate ion from solution. After preliminary testing of fish, several aquatic plants, algae and clams, a system of natural algal succession and beds of the oriental clam Corbicula fluminea Muller was chosen. Experiments were conducted under controlled conditions at phosphate concentrations of 5.0, 10.0, and 15.0 mg/liter. The results indicated that this system can remove the phosphate ion to below 0.30 mg/liter in 16 days or less and yield a clear effluent acceptable for reuse. A potential fishery and possibly other water-based recreation appears feasible. Originally this research was to be conducted with tertiary treated municipal wastewater, but completion of the city facility was delayed and consequently it was necessary to simulate 'wastewater' by adding phosphates and nitrates to local well water. (Woodard-USGS)

VORTEX CONCEPT FOR SEPARATING OIL FROM WATER,

United Aircraft Research Lab., East Hartford, Conn.

For primary bibliographic entry see Field 05G. W74-01148

STUDY OF WATER RECOVERY AND SOLID WASTE PROCESSING FOR AEROSPACE AND DOMESTIC APPLICATIONS: VOLUME 1 - FINAL REPORT SUMMARY, Grumman Aerospace Corp., Bethpage, N.Y. C. A. Guarneri, A. Reed, and R. E. Renman.

Grumman Aerospace Corp., Bethpage, N.Y.
C. A. Guarneri, A. Reed, and R. E. Renman.
Available from NTIS, Springfield, Va 22151, N7319158 - Price \$3.00 printed copy; \$1.45 microfiche.
National Aeronautics and Space Administration,
Contract Report CR-128857, 1973. 28 p, 8 fig, 2
tab. NAS-9-12503.

Descriptors: *Water reuse, *Waste water treatment, Water resources development, Model studies, Economics, Water utilization, Community development, Surveys, Evaluation, Land use, Land development, Costs, *Solid wastes. Identifiers: Commercial equipment, *Aerospace technology, Community models.

During the past decade, the NASA, and aerospace and commercial industries have been concurrently advancing water and waste management technological gy. This study explores the application of advanced concepts for water recovery and solid waste processing systems for residential use. Its objective is to define a system concept which of-fers the best potential for near term and future usage. Concepts are developed and evaluated within the context of a total system that would provide all necessary utilities to a 'free standing' community. For this study a community model consisting of 500 newly constructed low rise apartment units with four occupants per unit has been assumed. The study was initiated with a regional overview of water resource factors as they affect new community planning. Determinations of residential water use and waste generation rates were also made. (Woodard-USGS) W74-01280

1968 INVENTORY OF MUNICIPAL WASTE FACILITIES, A COOPERATIVE STATE REPORT: REGION 5, ILLINOIS, INDIANA, MICHIGAN, MINNESOTA, OHIO, WISCONSIN. Environmental Protection Agency, Washington, D.C. Office of Water Programs.

Available from GPO, Washington, D.C., 20402, Price \$2.00. EPA Publication No OWP-1, Vol 5, 1971. 249 p.

Descriptors: "Waste water treatment, "Municipal wastes, "Treatment facilities, Documentation, Classification, Indexing, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, Sites, Waste water disposal, Sewage effluents, Industrial wastes, Streams, "Great Lakes region.

The municipal waste facilities described in this publication (10 volumes of which this report is Vo 5) are those reported by the States and Territories of the United States as being in place on January 1, 1968. The data presented were collected by the various State and Territorial water pollution control agencies and processed through the Regional and Headquarters offices of the Federal Water Pollution Control Administration (now Environmental Protection Agency). Volume 5 includes waste facilities in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. A facility is defined as a treatment plant, or, where wastewater is discharged raw, the collection system, for dispoal of domestic and industrial wastewaters. The facilities reported are those associated with municipal-type operations. Facilities are listed alphabetically within States by community or, where a sanitary district, public utility district, etc., is concerned,

by the name of that entity. Following the listing of individual facilities there is for each State a summary of plants serving communities other than their own with the names of the 'served' communities. (Woodard-USGS) W74-01282

IMPROVED WASTE DISPOSAL UNIT,

Army Land Warfare Lab., Aberdeen Proving Ground, Md. H. H. Rosen.

Available from NTIS, Springfield, Va., 22151, AD-758 842 Price \$3.00 printed copy; \$1.45 microfiche. Technical Report No LWL-CR-04B71, March 1973. 21 p, 16 fig. 1 append.

Descriptors: *Sewage disposal, *Environmental sanitation, Environmental control, Water pollution control, Design, *Waste disposal, Specifications, Structural engineering, Military aspects, *Septic tanks, *Waste water treatment. Identifiers: Latrines.

In Vietnam the practice of using burn-out type latrines proved to be highly unsatisfactory. The requirements for ecological acceptability for systems accentuated the search for new developments in waste disposal. The septic tank principle is an acceptable solution to the problem. The principle has been in effective use for a long time and as applied here, without the large quantities of flush water generally associated with home use, even soils with poor percolation are amenable to this system. Using this principle, an inexpensive and disposable unit, compact, light weight, but capable of handling the waste of up to two hundred men per day, is described. The system, weighing approximately 125 pounds, consists of a 4 ft x 2 ft x 2 ft fiberglass box and lid with plastic piping. It is field assembled without special tools and requires only the digging of a trench and the fabrication of a latrine box for its emplacement. (Woodard-USGS) W74-01284

PRESSURIZED SEWER COLLECTION SYSTEMS,

Illinois Inst. for Environmental Quality, Chicago.

J. Leckman.

Available from NTIS, Springfield, Va., 22151, PB-216 166 Price \$3.75 Printed copy; \$1.45 microfiche. Illinois Institute for Environmental Quality, Chicago, Contract report, November 1972. 36 p, 1 fig. 4 tab, 11 ref.

Descriptors: *Sewerage, *Sewage treatment, *Sewers, *Domestic wastes, Pumps, Pipes, Design criteria, Pressure, Costs, Installation costs, Maintenance costs, *Waste water treatment. Identifiers: *Pressurized sewers, Grinder pump equipment.

The grinder pump/pressurized collection systems have different characteristics than a conventional gravity sewage system. For example, the waste-water is stored at the home site and then discharged at a uniform rate at some future time that is not necessarily related to consumption of the water; consequently, sewage discharge is not as directly related to water consumption as it is in a gravity sewage collection system. Also, being in a pressurized system, infiltration is not encountered; therefore, the total volume of water delivered to a sewage treatment plant is con-siderably less. The commercial grinder pump package unit generally consists of a grinder, pump, shut off valve, check valve, electrical controls, fiberglass or stell housing, and accessories to make the unit completely operable with only the electrical power connections and sewer inlet-outlet connections required for field installation. The cost for the package unit with installation is between \$1,000 to \$1,500 depending on the manufacturer selected and whether an indoor or out-door location is used. Monthly operational cost of

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Waste Treatment Processes—Group 5D

a pump grinder unit is minimal and consists primarily of the cost of electricity. (Woodard-USGS) W74-01286

A MODIFIED FILTRATION METHOD FOR THE ANALYSIS OF WASTEWATER SUSPENDED SOLIDS,

Metropolitan Denver Sewage Disposal District No. 1, Commerce City, Colo. For primary bibliographic entry see Field 05A.

HEAVY METALS IN WASTEWATER AND TREATMENT PLANT EFFLUENTS, Interstate Sanitation Commission, New York. For primary bibliographic entry see Field 05A. W74-01319

FATE OF LIGNIN IN KRAFT EFFLUENT TREATMENT, Toronto Univ. (Ontario). Dept. of Civil Engineer-

Toronto Univ. (Ontario). Dept. of Civil Engineering.

For primary bibliographic entry see Field 05B. W74-01320

NUTRIENT REMOVAL USING LEMNA MINOR,

Florida Dept. of Pollution Control, Tallahassee. For primary bibliographic entry see Field 05C. W74-01321

FUNCTIONAL WATER AND SEWERAGE PLAN AND PROGRAM. LBC and W Associates, Columbia, S.C.

Final report prepared for Isothermal Planning and Development Commission, Rutherfordton, N.C., July, 1973. 123 p, 5 maps, 22 tab, 3 append. HUD Grant NCP-1006-NM2.

Descriptors: *Planning, *Water supply, *Sewerage, *North Carolina, Water demand, Water quality, Environmental effects, Waste water treatment, Treatment facilities.

Identifiers: *Utility extension, Goals, Cleveland County (N.C.), Rutherford County (N.C.), Polk County (N.C.), McDowell County (N.C.),

This comprehensive planning report identifies existing water supply and distribution facilities, wastewater collection and treatment facilities, projects trends in population growth and land use, sets environmental goals, objectives, and criteria for planning, and recommends general programs for improving water and sewerage services. The area consists of Cleveland, Rutherford, Polk, and McDowell Counties, N. C., located between Asheville and Charlotte. Twenty-five organizations supply water to residences within the region, serving 53% of the population. Ten percent of supply for these systems comes from ground-water, the remainder from surface sources. Sixteen organizations collect or treat residential wastewater. Only 29% of the region's population is served. Population is projected to increase from 162,276 in 1970 to 179,197 in 1990. Population and water demands are projected for sub-regions. Environmental goals for water and sewerage services include encouraging adequate water and wastewater disposal services where feasible, using these services to control new development, and bringing waste discharges up to federal and state standards. Other objectives are insuring adequate water supplies for emergencies, insuring that stream water quality stays within prescribed state limits, protecting aquifer recharge areas by prohibiting in-compatible development in high groundwater areas, and requiring secondary wastewater treat-ment. Criteria are set for feasibility of services related to population density, line sizes, water pres-sures, plant capacities, and minimum design periods. It is recommended that interconnections be made between several specific water and sewer systems. Other recommendations are made for subregions. (Stein-North Carolina)

PROMOTING ENVIRONMENTAL QUALITY THROUGH URBAN PLANNING AND CONTROLS.

North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.

Urban and Regional Studies.

E. J. Kaiser, K. Elfers, S. Cohn, P. A. Reichert, and M. M. Hufschmidt.

Prepared for Environmental Protection Agency, Washington, D.C., June, 1973. 465 p, 16 fig, 2 tab, 1 append. EPA grant R801376.

Descriptors: *Planning, *Environmental effects, *Water management (Applied), Waste water, *Storm drainage, Watersheds (Basins), *Flood plains, *Urbanization, Land use, Estuaries, Regional development.

plants, "Clouds and the gional development.
Identifiers: "Urban guidance systems, Water-land use interfaces, Land use planning, Urban water-fronts, Metropolitan planning.

This comprehensive study focuses on the current practices of local and metropolitan planning agencies in promoting environmental quality through urban planning and controls. The report looks at the beginnings of local environmental quality planning in the 1960's, presents the results of a questionnaire to local planning agencies on the state of current planning, and then focuses on more detailed examples of promising environmental quality planning approaches for the 1970's. These promising approaches of planning and urban guidance cover the substantive areas of land use planning, water resources management, urban design, and residuals management. The water resources management chapter emphasizes the in-terface between urban land use and water resources with particular attention to the problems and planning approaches related to the urbaniza-tion of watersheds, shorelands, floodplains, and estuarine areas. Emphasis is also placed on the improvement and redevelopment of urban-water interfaces in fully developed urban areas. These interfaces include wastewater management systems. storm water drainage, and urban waterfronts. A final section discusses the potential for integration of water resources systems on a metropolitan basis. Some of the key planning and guidance tools identified include development of guideline reports, policy statements, permit systems, floodplain zoning, effluents charges, utility extensions, tax policies, on-site storm water detention, and wastewater reclamation. (Effers-North Carolina) W74-01470

RELATING COMPREHENSIVE SEWER AND WATER PLANS TO THE COUNTY LAND USE PLAN. GOALS, POLICIES AND STANDARDS. Chenango County Planning Board, Norwich, N.Y.

Available from the National Technical Information Service as PB-218 242 \$3.00, in paper copy, \$1.45 in microfiche. June, 1972. 20 p, 3 maps. HUD grant N.Y.P. 223.

Descriptors: *Planning, *Sewerage, *Water supply, Priorities, Project planning, Project postevaluation, Land use, Water resource development, *New York. Identifiers: *Land use/water, Sewage plan interface, Chenango County (NY).

This report divides into three sections. The first reviews HUD circular MPD-6415-2A, which outlines requirements for certification to meet water and sewer facilities grant program planning requirements. The second section describes how the county's comprehensive land use plan must relate to the sewer and water program, including priority assignments to be developed by the County

Planning Board. Citizen participation is also requisite. The final section reviews the county's functional water and sewer plans with the three proposed land use plans, in terms of service area, level of anticipated development, and plan concept. The three land use plans range from minimum planning, direction, and control of the consequences of existing land use patterns to commitment to consolidating growth in the present population centers capable of handling development. The basic concept of both the water and sewage plans was consistent with each land use plan in recognizing that each urbanized area should develop as an independent unit providing its own services to supply its own needs. A regional or inter-community approach would not be feasible. (Hoffman-North Carolina)

COMPREHENSIVE WATER AND SEWER PLAN, RANDOLPH COUNTY, ILLINOIS. Southwestern Illinois Metropolitan Area Planning Commission, Collinsville.

Available from the National Technical Information Service as PB-216 396, \$6.00 in paper copy, \$1.45 in microfiche. Report SWIL-MAPC-72-08, prepared for Randolph County Regional Planning Commission, December, 1972. 355 p, 16 fig, 35 plates, 100 tab, 97 ref, 3 append.

Descriptors: *Water supply development, *Sewerage, *Planning, *Illinois, Projections, Financing, Coordination, Water demand, Data collection, Treatment facilities, *Comprehensive planning, Waste water treatment.

Identifiers: *Randolph County (III), Water system expansion. Sewage treatment expansion.

The existing water and sewer systems in Randolph County, Illinois, are inventoried and analyzed with respect to their abilities to meet present and future projected demands. The upland areas, and in par ticular the northeast part of the county, lack adequate sources of water supply. Many of the municipal systems have low pressure areas that affect flow and quality. At least 18 sewage treatment facilities do not meet Illinois State Effluent Requirements. Furthermore, three facilities are operating at either full capacity or past design capacity levels. Local and countywide develop-ment policies, as reflected in comprehensive development plans, were used as a guide in developing recommendations. On the basis of yield capacity and the quality of the source being used to supply the individual household, central water systems were recommended for 13 communities. The county was divided into three study areas for delineation of improvement of water facilities. Details of the recommended plan for each area are included. Each sewer system is separately evaluated for needed short term and long range improvements. While a stated objective was to consolidate treatment facilities whenever possible, this was judged not cost-effective for short term planning. As short term improvements could meet existing and long range needs, the sewer facilities plan consists of maintaining individual sewer system and treatment facilities. Various methods of financing are discussed. (Hoffman-North Carolina) W74-01474

STORM DRAINAGE AND FLOOD CONTROL FOR METROPOLITAN DENVER. Denver Regional Council of Governments, Colo. For primary bibliographic entry see Field 04A. W74-01475

REVIEW OF PLANNING FOR THE GRAND RIVER WATERSHED.

October 20, 1971. 107 p, 16 fig, 7 tab, 29 ref, 5 append. 229.

Group 5D-Waste Treatment Processes

Descriptors: *Watershed management, *Water quality control, *Low-flow augmentation, *Computer models, Dams, Reservoirs, Waste water treatment, *Canada, Soil conservation, Groundwater, Flood control.

Identifiers: Computer simulation, Kitchener (Ont), Guelph (Ont), Brantford (Ont), *Grand River (Ont).

An investigation was made of issues related to watershed management for the 2,600-square mile Grand River watershed in Ontario, in which are located the cities of Kitchener, Guelph, and Brantford. Twenty-four recommendations for water management are discussed. The first priority: construction of a dam on the Speed River above Guelph, primarily for low-flow augmentation needed to maintain water quality, but also for flood control and recreation. Second priority: investigate methods to reduce loadings on the Speed River from the Guelph wastewater treatment plant. Third and fourth priorities: permit industrial wastes to be input to the Elmira treatment plant without adversely affecting the treatment process and construction of a low-flow augmentation dam above Elmira. Other recommendations call for other specific reservoirs for low-flow augmentation, employment of computer simulation to plan water management around water quality constraints, control of pollutants not now regulated by the Ontario Water Resources Commission and restricted growth upstream from certain cities. Conservation practices, intergovernmental cooperation, and several specific further studies are recommended. It is felt that Guleph should continue to obtain its water supply from groundwater for at least 30 years, thereby freeing surface water for use elsewhere. Appendices consider recreation facilities, flood control alternatives, and water supply alternatives in the basin. (Stein-North Carolina) W74-01478

WATER MASTER PLAN. EUGENE-SPRIN-GFIELD URBANIZING AREA.

Edmundson, Kochendoerfer, and Kennedy, Portland, Oreg.; and Daniel, Mann, Johnson, and Men-

denhall, Portland, Oreg.
For primary bibliographic entry see Field 03D. W74-01479

UTILITY PROVISIONS ANALYSIS FOR EAST CENTRAL FLORIDA. Reynolds, Smith and Hills, Jacksonville, Fla.

For primary bibliographic entry see Field 06D. W74-01480

AVAILABILITY OF FRESH WATER IN THE EAST CENTRAL FLORIDA PLANNING RE-GION

Aase (George) and Associates, Inc., Tallahassee, Fla.

For primary bibliographic entry see Field 06D. W74-01481

REPORT ON LAUREL CREEK CHANNEL IM-PROVEMENTS, WATERLOO BRIDGEPORT, ONTARIO. Kilbom Engineering Ltd., Toronto (Ontario). For primary bibliographic entry see Field 04A.

FLOODLAND AND SHORELAND DEVELOP-

MENT GUIDE. Southeastern Wisconsin Regional Planning Commission, Waukesha.

W74-01482

For primary bibliographic entry see Field 04A. W74-01483

A GROWING COMMUNITY: 1973 UPDATE. (LEXINGTON, KENTUCKY). Lexington and Fayette County Planning Commis

1973. 159 P. 37 FIG. 41 MAPS, 145 TAB.

sion, Lexington, Ky.

Descriptors: *Comprehensive planning, *Water supply, *Sewage disposal, *Kentucky, River basin development, Drainage, Storm runoff, Septic tanks.
Identifiers: *Lexington (Ky), Kentucky River,

Red River (Ky), Gorges.

A many-faceted comprehensive development plan describes present situations, identifies goals and/or trends, and projects future actions. The major surface water quality problem is pollution from sewage effluent discharges. Offenders include point and non-point sources, but there is no quantification of pollution contributions. Bacterial, chemical, and detergent pollution is found in all streams. Bacterial pollution characterizes 70% of groundwater samples. The Lexington area is provided with 62 MGD raw water in 1973 from the Kentucky River and Hickman Creek watersheds. The Kentucky River is judged capable of supplying a sufficient quantity of water until 1980, but the proposed Red River Dam and other sources may become necessary suppliers. Cause for delay in building of Red River Dam has been protests from environmentalists that Red River Gorge is a unique site. Water demand by type of customer is projected in 5-year increments to 1990. Seven storm drainage basins and their \$22 million of improvement needs are discussed individually. A cost summary is also given. The natural drainage system of Lexington is complicated by the city position on a divide with watersheds falling off in all directions; sewage disposal problems are thereby complicated by the need for many sewage treatment plants. Two municipal sewage treatment plants serve the area, along with eighteen smaller non-municipal plants. Since 1964, a minimum of 10 acres has been required for septic tank installation. Plans are detailed for expansion of sewers to presently unserviced areas. (Stein-North Carolina) W74-01484

SKETCH DEVELOPMENT PLAN, CHAMBERS COUNTY, ALABAMA.
East Alabama Regional Planning and Develop-

ment Commission, Anniston.

Final Report, June 1973. 111 p. 34 fig. 20 tab, 12 ref. HUD 701 Grant no. 1020.

*Water Descriptors: *Planning. supply. *Alabama, *Sewage districts, Water treatment, Water pollution, Water districts.

Identifiers: *Chattahoochee River (Ala),

Lafayette (Ala), Lanett (Ala), Chambers County

The sketch development plan is a compilation of data with analysis, some suggested goals, and some recommendations pertaining to the county's development, with the degree of detail varying for different problem areas. Chambers County, Alabama, is rural, but contains two urban centers. Lafayette and Lanett. Population is declining, but urbanization continues in the urban clusters, espe-cially in the 'sprawling' Chattahoochee Valley area around Lanett. Water supplies for the county come primarily from groundwater although Lafayette draws its supply from a small lake and the Valley district from the Chattahoochee. There are 5 public water systems serving 70% of the population. Samples reveal a high number of contaminated wells in use in rural areas. Four sewer systems serve 37% of the county's population. All sewer collection systems presently dispose sewage raw into collector streams. Plants which will provide primary and secondary treatment are now under construction in all four systems. The remaining unsewered areas of Chambers County are said to be too sparsely populated to warrant public sewers, save for an area adjacent to Lanett. Each water, sewerage, and storm sewer system in the county is examined individually. An unusual provider of services is the East Alabama, Water. Sewer, and Fire Protection District, a public corporation created to serve the urbanized but unincorporated areas south of Lanett, but empowered by the State to expand into municipalities and other counties. Treated water supplies for the entire Chattahoochee Valley urban corridor are purchased from West Point Pepperell, Inc., a textile manufacturer. Other water-related plans for the county are given. (Stein-North Carolina)

VIRUS CONCENTRATION FROM SEWAGE. Baylor Coll. of Medicine, Houston, Tex. Dept. of Virology and Epidemiology

A. Homma, M. D. Sobsey, C. Wallis, and J. L.

Water Research, Vol 7, No 7, p 945-950, July 1973. 1 fig. 5 tab. 7 ref.

Descriptors: *Separation techniques, *Filtration, *Sewage, *Adsorption, *Viruses, Filters, Waste water treatment.

Identifiers: Preconcentration, Sample preparation.

Optimal conditions for concentrating poliovirus from large volumes of raw sewage have been established. Solids 1 millimicron or larger, present in the raw sewage, were removed by textile clarifying filters without significant retention of virus. By acidification of the clarified sewage and addition of salts to enhance virus attachment to the adsorbent, virus in the sewage was concentrated on a fibre glass depth filter, with subsequent elution of virus into small volumes suitable for assay. An 80-95 percent efficiency of virus concentration was effected. (Little-Battelle) W74-01533

BACTERIOLOGY OF ACTIVATED SLUDGE, IN PARTICULAR THE FILAMENTOUS BACTERIA,

Agricultural Univ., Wageningen (Netherlands). Lab. of Microbiology.
For primary bibliographic entry see Field 05B. W74-01540

MICROFAUNA OF ACTIVATED SLUDGE. PART III. THE EFFECT OF PHYSICO-CHEM-ICAL FACTORS ON THE OCCURRENCE OF MICROFAUNA IN THE ANNUAL CYCLE, Instytut Gospodarki Kommunalnej, Warsaw (Poland). Pracownia Hydrobiol. For primary bibliographic entry see Field 05C. W74-01542

BIODEGRADATION OF O-BENZYL--P-CHLOROPHENOL. Monsanto Co., St. Louis, Mo. For primary bibliographic entry see Field 05B. W74-01552

THE ACTION OF MINERAL FERTILIZATION ON PASTURE HERBAGE, IRRIGATED WITH ON PASTURE HEAD. SEWAGE, (IN RUSSIAN), Selskokhozyaistvennaya

Nakademiya (USSR). V. P. Spasov. Doki Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina. 1. p 25-26. 1972. Illus.

Identifiers: Calcium, *Fertilization, Herbage, Irrigated areas, *Minerals, Nitrogen, Pasture, Phosphorus, Potassium, *Sewage.

The effect of sewage upon pasturable herbage, increases of N, P105, K20 and CaO was investigated. As a control fields that were not irrigated and fields that were irrigated with river

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Water Treatment and Quality Alteration—Group 5F

water were investigated. Fertilization was always more effective in conjunction with sewate applica-tion.--Copyright 1973, Biological Abstracts, Inc. W74-0155

COMPARATIVE EVALUATION OF THE EF-FICACY OF OZONIZATION AND OTHER MEANS OF TREATING WATER CON-TAIMINATED WITH OIL PRODUCTS (IN RUS-SIAN).

Moskovskii Gosudarstvennyi Meditsinskii Institut For primary bibliographic entry see Field 05F.

W74-01580

BARRIER ROLE OF WATER WORKS INSTAL-LATIONS IN RESPECT TO CHEMICAL CON-TAMINATIONS CLASSIFIED ACCORDING TO ORGANOLEPTIC PROPERTIES OF HAZARDS. (IN RUSSIAN),

Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).

S. N. Cherkinskii, L. N. Gabrilevskaya, V. P.

Laskina, and M. N. Rubleva. Gig Sanit. Vol 37, No 5, p 12-15, 1972. (English

immary). Identifiers: Barrier role, *Chemical contamination, *Organoleptic properties, Water works in-

stallations, *Waste water treatment. Investigations show the protective capacity of physico-chemical processes of water treatment with respect to 30 kinds of chemical industrial contaminations. The results point to an extremely insignificant decontaminating effect of the ordinary

water works installations for industrial chemical contaminations .-- Copyright 1973, Biological Ab-

stracts, Inc. W74-01584

A BILL TO BE KNOWN AS THE 'RIVER BASIN WASTE TREATMENT AUTHORITY ACT OF

1973'. For primary bibliographic entry see Field 06E. W74-01614

THE ROLE OF MICRO-ORGANISMS IN WASTE TIP-LAGOON SYSTEMS PURIFYING COKE-OVEN EFFLUENTS, University Coll. of South Wales and Monmouthshire, Cardiff. Dept. of Microbiology. D. A. Stafford, and A. G. Callely.
Journal of Applied Bacteriology, Vol 36, No 1, p. 77-87, March 1973 6 iii. 3 tab. 12 ref.

77-87, March 1973. 6 fig, 3 tab, 12 ref.

Descriptors: *Aerobic bacteria, *Microbial degradation, *Lagoons, Liquid wastes, Microorganisms, *Phenols, Biodegradation, Waste water (Pollution), Waste water treatment, Water purifi-

Identifiers: *Coke-oven effluents. Colliery waste tips, Orthophosphates, Substrate utilization, Fate of pollutants, Tip liquors, Thiocyanates, Coking industry, Monohydric phenols, Heterotrophic bac-teria, Enrichment.

The population of aerobic bacteria present in the waters of a tip-lagoon system being used to purify a coke-oven effluent has been investigated. Though organisms capable of degrading phenol were detected, the total bacterial population was low, mainly due to a deficiency of orthophosphate and lack of aeration. Phenols can be removed from coke-oven effluents by allowing them to percolate through columns of material from colliery waste tips. Bacteria need not be present for this to occur though the presence of bacteria capable of degrading phenol was detected in the liquid coming from such columns. Only traces of thiocyanate are removed. If a biological filter can be developed, as on columns packed with gravel, better removal of phenols and thiocyanate occurs, but it is doubtful if bacteria play any significant role in the purification of coke-oven waste liquors percolating through tips of colliery waste. (Holoman-Battelle)

5E. Ultimate Disposal of Wastes

CATEGORIES OF RELATIVE FEASIBILITY FOR SEPTIC-TANK FILTER FIELDS IN KNOX

COUNTY, TENNESSEE, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C. W74-01145

IMPROVED WASTE DISPOSAL UNIT,

Army Land Warfare Lab., Aberdeen Proving Ground, Md.

For primary bibliographic entry see Field 05D. W74-01284

A COST-EFFECTIVENESS STUDY AND ANAL-YSIS OF MUNICIPAL REFUSE DISPOSAL

Arizona Univ., Tucson.

M. L. Popovich.

Department of Hydrology and Water Resources, Technical Report No. 20, Natural Resources Systems Series, Jun 1973. 70 p, 7 tab, 40 ref.

Descriptors: *Solid wastes, *Waste disposal, *Landfills, *Water pollution sources, *Cost analysis, Leaching, Recycling, Groundwater, Water quality, Waste dumps, *Arizona, Economic in-pact, Social values, Burining. Identifiers: *Tucson (Ariz).

A comparison of alternative systems of disposing efficiently and effectively of four to five pounds of solid waste per person per day in U.S. urban communities is undertaken by using standardized cost-effectiveness methodology. The economic criteria for studying this problem are often limited to cost or marketing measures; in contrast, use of a cost-effectiveness approach allows the inclusion of non-quantifiable measures of effectiveness such as public acceptance, politics, health risks, environmental considerations, and soil benefits. Data from a case study in Tucson, Arizona, are used to illustrate the problem. The specifically arid conditions of the example area are important in the analysis of such problems in other desert areas. Emphasis is placed on the effects of solid waste disposal in sanitary land fills on groundwater quality in arid regions, such as Tucson. Due to the shallow infiltration of surface water on the desert floor and the consumption of this water by desert plants, coupled with up to six feet of soil, the possibility of water infiltration into such fills seems small. (Muller-Arizona) W74-01631

5F. Water Treatment and **Quality Alteration**

WATER. EXAMINATION. ASSESSMENT. CON-DITIONING. CHEMISTRY. BACTERIOLOGY. BIOLOGY.

Walter de Gruyter: Berlin, West Germany; New

watter de Gruyter: Berinn, west Germany; New York, N.Y., 1972. 389 p. Illus. \$24.00. Identifiers: Assessment, *Bacteriology, Biology, Chemistry, Conditioning, Examination, *Potable water, *Water analysis, *Water treatment, Pollutant identification.

Although this book, translated from the 5th German edition, is primarily devoted to drinking water, discussions on other closely related uses for water are included. The book is based on practical experience and is written for practical use, omitting theoretical discussions and chemical equations where possible. In Part 1 dealing with the chemistry of water, investigations of drinking water, general remarks about chemical examination of water, drinking water analysis, assessment of drinking water, major drinking water analysis of tap water, assessment of drinking water and service water for central water supply, examination and assessment of bath water, water for building purposes, surface water and waste-water and mineral water and medicinal water are discussed. In Part 2 bacteriology of drinking water, water and disease, inspection of the site, sampling, deter-mination of the bacterial count, detection of various foreign organisms in the water and the m brane filter procedure are included. In the final part, biology of water, methods of biological water investigations and methods of combatting organisms in drinking water supply plants are con-sidered. Many diagrams and tables are provided throughout. Each of the 3 sections ends with a related bibliography .-- Copyright 1973, Biological Abstracts, Inc.

THE CHARACTERISTICS OF THE RAW WATERS OF HASDED RIVER AND DHENGUR NALA AT KORBA (M. P.), Fertilizer Corp. of India, Sindri. Planning and Development Div. For primary bibliographic entry see Field 05A.

W74-01240

EPIDEMIOLOGICAL AND TOXICOLOGICAL

ASPECTS OF NITRATES AND NITRITES IN THE ENVIRONMENT, Hadassah Medical School, Jerusalem (Israel). En-

vironmental Health Lab.
For primary bibliographic entry see Field 05C.
W74-01386

DRINKING WATER,

J. Crossland, and V. Brodine. Environment, Vol 15, No 3, p 11-19, April, 1973.

Descriptors: *Water supply, *Water quality standards, *Water pollution, Water quality, Viruses, Nitrates, Nitrites, Potable water, Chlorine, Salts, Oil, Soil microorganisms, *Potable water. Identifiers: Toxic metals, Chlorinated hydrocar-

Chemicals and viruses present in drinking water in the U. S. which have either been proven or are suspected to be dangerous to humans are surveyed. A Bureau of Water Hygiene study in 1969 found that 41% of 969 drinking water systems failed to meet 1962 Public Health Service standards, while 36% of 2,595 water taps sampled contained at least one contaminant in amount exceeding drinking water standards, and 10% exceeded standards for total organic chemical compounds. There are 496 organic chemicals found or suspected to be contaminating water in various parts of the country. Nitrates, which may be converted to nitrites which react with hemoglobin in the red blood cells, causing disability to carry oxygen, were found in 19 of the 969 water systems sampled by the Public Health Service. Application of highway deicing saits contributes large amounts of chloride and sodium to public water supplies. There is speculation as to the effects of toxic metals, chlorinated hydrocarbons, oil, viruses, and soil microorganisms in water supplies. The adequacy of current Public Health Service bacteriological standards is questioned in light of several major disease outbreaks in recent years. The difficulty of assessing safety margins provided by present treatment methods when pollu sources are used is emphasized. It is concluded that current standards and treatment processes are quate to provide water pure enough for drinking and swimming when supplies receive domestic, agricultural, and industrial wastes. (Stein-North Carolina) W74-01466

Group 5F-Water Treatment and Quality Alteration

SHIGELLA SONNEI ISOLATED FROM WELL WATER.

Iowa Univ., Iowa City. State Hygienic Lab. For primary bibliographic entry see Field 05A. W74-01551

SENSITIVITY OF THREE SELECTED BACTERIAL SPECIES TO OZONE.

Brooke Army Medical Center, Fort Sam Houston, Tex. Health Care Research Div. W. T. Broadwater, R. C. Hoehn, and P. H. King.

Applied Microbiology, Vol 26, No 3, p 391-393, September 1973. 2 fig, 15 ref.

Descriptors: *Ozone, Water pollution effects, *Lethal limit, Laboratory tests, *Bacteria, *E. coli, Bioassay, Disinfection, Water purification, Aerobic bacteria, Enteric bacteria, Coliforms, *Water treatment, Water quality, Bactericides. Identifiers: *Sensitivity, Spores, Vegetative cells, Coliforms, Bacillus megaterium, Bacillus cereus, Bacterial physiology, Sample preparation.

The minimal lethal concentration of ozone in water was determined for three bacterial species: Escherichia coli, Bacillus cereus, and Bacillus megaterium. A contact period of 5 min was selected. The lethal threshold concentration for the cells of B. cereus was 0.12 mg/liter while that for E. coli and B. megaterium was 0.19 mg/liter. Low concentrations of ozone were ineffective when organic matter was present to interfere with the action of ozone on the bacterial cells. Also determined during the study was the sensitivity of spores of B. cereus and B. megaterium to ozone in water. The threshold concentration required to kill the spores of both species was 2.29 mg/liter. The cells and spores of these organisms exhibited the 'all-or-none' die-away phenomenon normally as-sociated with ozone treatment. The results indicate that ozone, in relatively low concentrations, is an effective bactericide against both vegetative cells and spores of three bacterial species. In practical applications, ozone most probably would be applied at higher dosages (0.5-10 mg/liter) and for longer contact periods (2-10 min) because, as was shown in this research, organic matter present in the water will exert an ozone demand and prevent the full utilization of the applied dose as a disinfectant. (Holoman-Battelle) W74-01553

EFFECT OF PARTIAL DEFLUORIDATION OF A WATER SUPPLY ON DENTAL FLUOROSIS: FINAL RESULTS IN BARTLETT, TEXAS, AFTER 17 YEARS,

National Inst. of Dental Research, Bethesda, Md. H. S. Horowitz, and S. B. Heifetz. Am J Public Health, Vol 62, No 6, p 767-769, 1972.

Identifiers: *Defluoridation plant, Dental, *Fluorosis, *Texas (Bartlett), Years, Potable water, *Water treatment.

In 1952, a defluoridation plant was installed in a small community in Texas to demonstrate an efective means of removing excess fluorides from drinking water. A final survey made in 1969 showed that the prevalence of fluorosis was reduced dramatically by partial defluoridation.--Copyright 1973, Biological Abstracts, Inc. W74-01578

COMPARATIVE EVALUATION OF THE EFFICACY OF OZONIZATION AND OTHER MEANS OF TREATING WATER CONTAINMINATED WITH OIL PRODUCTS (IN RUS-SIAN),

Moskovskii Gosudarstvennyi Meditsinskii Institut

(I). S. N. Cherkinskii, and A. A. Korolev. Gig Sanit, Vol 37, No 4, p 14-18, 1972, Illus, En-

glish summary. Identifiers: Comparative, Contaminated water, *Oil wastes, *Ozonization, *Water treatm_nt, Potable water, Oil pollution, *Waste water treatThe efficacy of ozonization and certain widely used methods of treatment of drinking water contaminated with oil products was studied. Ozonization is an effective means of improving the quality of such water. The possibility of attaining the hygienic effect when only ozone is used depends the initial concentration of oil products in the water. Thus, in cases of heavy contamination of water with oil products, the ozone treatment must be preceded by other means of decontamination.--Copyright 1973, Biological Abstracts, Inc. W74-01580

REFECTS OF DRINKING METABOLIC BRACKISH WATER, Central Negev Hospital, Beersheba (Israel)

For primary bibliographic entry see Field 05C. W74-01632

5G. Water Quality Control

THE IMPACT OF WATER POLLUTION ABATEMENT ON COMPETITION AND PRICING IN THE ALABAMA TEXTILE INDUSTRY, Auburn Univ., Ala. Water Resources Research Inst.

Hal B. Pickle, and A. C. Rucks. Available from the National Technical Informa-tion Service as PB-225 156/9, \$4.50 in paper copy, \$1.45 in microfiche. Bulletin 11, 1973. 145 p, 21 fig, 30 tab, 175 ref. OWRR C-3292 (No 3715) (1).

Descriptors: *Alabama, *Economic impact, *Industrial wastes, Marketing, *Pollution abatement, *Prices, Value, *Competitive prices, Competition, Cost analysis, Textiles.
Identifiers: *Textile industry.

In order to access the impact of water pollution abatement on competition and pricing in the Alabama textile industry, three questions were answered. (1) How much is water pollution abatement costing the textile industry. (2) How is the intermediate consumer affected by these costs. (3) How is the ultimate consumer affected by the cost of water pollution control. The cost of water pollution control for firms in the Alabama textile industry ranges from \$64.40 per million gallons (MG) to \$85.50 per MG. As a percent of total manufacturing costs, the cost of waste treatment ranges from 0.33 percent to 1.31 percent. Due to the competitive condition of the textile industry, all firms absorb the cost of water pollution control. If a firm in the textile industry were to decide to pass on a cost increase to customers the firm could expect 30 percent of the customers to shift to either another domestic or a foreign supplier, at price increases of less than 3 percent. At price increase in excess of 3 percent, a firm could expect 85 percent of its customers to shift to either another domestic or a foreign supplier. There will be no price increase on textile products to ultimate or final consumer. W74-01101

VORTEX CONCEPT FOR SEPARATING OIL FROM WATER

United Aircraft Research Lab., East Hartford,

R. L. Stoeffler, and C. E. Jones.

Available from NTIS, Springfield, Va. 22151 as AD-758 320, \$3.00 printed copy; \$1.45 microfiche. Final Engineering Report No. L911354-8 to U.S. Coast Guard, January 1973. 77 p, 35 fig, 8 tab, 9 ref. DOT Contract CG-20253-A.

Descriptors: *Oily water, *Separation techniques, *Ships, Methodology, Vortices, Scaling, Flow separations, Testing procedures, Equipment, Centrifugal pumps, Evaluation.

Identifiers: *Vortex oil and water separator.

The vortex separator separates oil from an oil-water mixture on a continuous flow basis. This

study was in three parts: (1) an experimental investigation of 10- and 50-gpm separators to determine performance throughout ranges of geometric and flow conditions, (2) experiments and analyses to determine a technique for scaling, and (3) an analytical evaluation of 100-, 1000-, and 10,000-gpm separator systems for shipboard operation. The tests with the two separators showed that for oil concentrations of the inlet oil-water mixture up to 5000 ppm, the concentration of oil in the clean water exhaust was 30 ppm or less; for oil concentrations of the mixture up to 10,000 ppm, the concentration of oil in the exhaust was 60 ppm or less. The scaling of vortex separators indicated that separators having good performance can be designed for flows up to about 200 gpm. Parallel operation with two or more separators will be required for flow rates greater than 200 gpm. The analytical evaluation of separators for shipboard operation indicated that 100- and 1000-gpm systems appear feasible. For larger systems, the space and power requirements may be excessive. he results of a study of a 250,000 dwt tanker indicate that an 800- or 900-gpm system would provide sufficient capacity for ballast water cleaning. (Woodard-USGS) W74-01148

MOBILE OXYGEN DISPERSION CRAFT,

Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.

W. Whipple, Jr.

Water Resources Bulletin, American Water Resources Association, Vol 9, No 4, p 639-646. August 1973. 3 fig, 1 tab, 4 ref.

Descriptors: *Aeration, *Oxygenation, *Water quality, Economic analysis, Waterways, Disper-sion, Water pollution control, Pollution abatement, Bubble

Identifiers: *Instream aeration, *Induced oxveenation.

Water pollution control by effluent treatment becomes increasingly expensive as the degree of treatment is increased. As has previously been demonstrated, instream aeration provides an economical alternative for the higher degrees of treatment. For large, deep, navigable rivers, another alternative may be still more economical, namely, mobile oxygenating craft, using fine bubble diffusers. The propellors in the craft plus its mobility would give important advantages in dispersing the oxygenated water; and one craft could replace a multiplicity of static aeration sites. W74-01232

NITRATES IN SOIL AND GROUND WATER BENEATH IRRIGATED AND FERTILIZED CROPS, Agricultural Research Service, Fresno, Calif. Soil

and Water Conservation Research Div. For primary bibliographic entry see Field 03F.

SWEDISH LAKE RESTORATION PROGRAM GETS RESULTS, Lund Univ. (Sweden). Limnological Inst.

Ambio, Vol 1, No 5, p 153-165, 1972, Illus. Identifiers: *Lake restoration, Tunis, Tunisia, *Sweden, *Aeration.

Lake restoration projects are being carried out in Sweden in order to obtain methods for restoring irreversibly damaged lakes, to train limnologists and to contribute knowledge to theoretical ecology. Lake Trummen was a shallow, over-exploited recipient, and the black sediment from the lake's receiver period was pumped up into settling ponds on land. In Jarla Lake, a deep recipient, the O2 deficiency in the hypolimnion was remedied by aeration without disturbing the thermal stratifica-tion. Hornborga Lake became overgrown with

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Water Quality Control—Group 5G

macrophytes after the water level was lowered. Methods for directing the development from emergent to underwater vegetation have been worked out in order to reestablish the environmental conditions of a waterfowl lake. Methods and ex-perience gained in the Swedish projects are being applied in the planning of the restoration of the Lake of Tunis in Tunisia .-- Copyright 1973, Biological Abstracts, Inc. W74-01262

OCEAN UTILIZATION AND COASTAL ZONE DEVELOPMENT.

Massachusetts Inst. of Tech., Cambridge For primary bibliographic entry see Field 02L. W74-01281

OXNARD BASIN EXPERIMENTAL EXTRAC-TION-TYPE BARRIER, California State Dept. of Water Resources, Sacra-

mento.

For primary bibliographic entry see Field 08B. W74-01289

EFFECTS OF PARAQUAT ON INVERTEBRATES IN A CANTEBURY STREAM, NEW

ZEALAND,
Ministry of Agriculture and Fisheries, Wellington
(New Zealand). Fisheries Research Div. For primary bibliographic entry see Field 05C. W74-01298

CHARACTERIZATION AND TREATABILITY OF POMACE STILLAGE,

California Univ., Davis. Dept. of Civil Engineer-For primary bibliographic entry see Field 05A. W74-01325

CONSOLIDATION OF IRRIGATION SYSTEMS: PHASE 1, ENGINEERING, LEGAL, AND SOCIOLOGICAL CONSTRAINTS AND/OR

FACILITATORS, Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.

For primary bibliographic entry see Field 03F.

W74-01367

INVENTORY AND EVALUATION OF INFOR-MATION ON DELAWARE BAY, VOLUME 2. Natural and Historic Resource Associates, Philadelphia, Pa.
For primary bibliographic entry see Field 06E.
W74-01369

ENGINEER'S REPORT FOR SOUTH VALLEY WATER SYSTEM.

Herkenhoff (Gordon) and Associates, Albuquerque, N. Mex. For primary bibliographic entry see Field 06B. W74-01382

LEAVES AS SOURCE OF PHOSPHORUS, Wisconsin Univ., Madison. Water Chemistry Program. For primary bibliographic entry see Field 05B.

THE SHIPOWNER AND OIL POLLUTION LIA-

W74-01407

P. D. Lowry. McGill Law Journal, Vol 18, No 4, p 577-591, December 1972. 76 ref.

Descriptors: *Legislation, *Canada, *Water pollution, Oceans, Ships, Water pollution sources, Water law, Oil wastes, Oily water, Law enforce-ment, Governments, Water quality standards, International law, Foreign waters.

A comprehensive analysis is presented of the shipowner's civil and criminal liability for oil pol-lution in Canadian waters. This liability was, on September 21, 1971, substantially increased by the promulgation of extensive amendments to the Canada Shipping Act. The shipowner's responsibility to the government for the costs of remedying the effects of an oil spill will become a matter of strict liability while previously it was limited to little more than a moral obligation. In like manner, damages suffered by individuals and private concerns will become recoverable from the shipowner or his insurers by a statutory right of action with provision for guaranteeing payment where previ-ously such claimants had only common law remedies on which to rely. The maximum penalty which may be imposed for the wrongful discharge of oil from a ship has been increased to \$100,000. The legislative background of the Act is reviewed, and the weight and practical effect of the liability for marine pollution are discussed. (Mockler-W74-01447

VIRGINIA NATURAL RESOURCES LAW AND THE NEW VIRGINIA WETLANDS ACT, For primary bibliographic entry see Field 02L.

MARINE POLLUTION: A CRITIQUE OF PRESENT AND PROPOSED INTERNATIONAL AGREEMENTS AND INSTITUTIONS--A SUG-GESTED GLOBAL OCEANS' ENVIRONMEN-TAL REGIME, San Francisco Univ., Calif.

L. R. Lanctot.

Hastings Law Journal, Vol 24, No 1, p 67-109, November 1972, 175 ref.

Descriptors: *Oceans, *Legal aspects, *Sea water, Water law, Water pollution control, Water resources development, International commissions, International law, International waters, Jurisdiction, Governments, Law of the sea, Foreign waters. Treaties.

Identifiers: *Territorial waters

Because the vast resources of the oceans were inaccessible in the past, international law does not provide any certain rules governing the ownership and development of marine resources which lie beyond the limits of national jurisdiction. In response to this legal uncertainty and in the face of accelerating technology, the United Nations General Assembly has called a General Conference on the Law of the Sea to formulate international conventions governing the development of the seabed and ocean floor. In preparation for the conference many countries have submitted proposed international seabed regimes for con-sideration. The existing law of the sea and the proposed seabed regimes are examined to determine to what extent they will ensure and enhance the environmental quality of the oceans and prooration. Features for a global oceans' environmen-tal regime are suggested. (Mockler-Florida) W74-01449 tect the marine environment from further deteri-

THE INTERSTATE WATER POLLUTION COM-PACT-PAPER TIGER OR EFFECTIVE REGU-LATORY DEVICE.

Oak Ridge National Lab., Tenn.

J. W. Curlin. Ecology Law Quarterly, Vol 2, p 333-356, Spring 1972. 135 ref, append.

Descriptors: *Interstate compacts, *Water pollu-tion control, Governments, Water policy, Water resources development, Interstate rivers, Water law, Governmental interrelations, Water quality standards, Federal governments

It is the express intention of Congress that the states are to bear the responsibility for the control

of pollution of both intrastate and interstate rs. Federal intervention is to be restricted to the following specific instances of danger to public health and welfare: When the states have refused to accept this responsibility, when requested by the downstream state receiving the pollutants, when requested by the governor of the state in which the discharge originates, or when substantial economic injury to shellfish has occurred in a non-discharge state. As a result, water quality standards for interstate waters can be violated so long as the discharge does not endanger human health or welfare and does not cause significant damage to the marketability of the shellfish. The act lacks substance since abatement of subhazardous violations depends upon voluntary action by the state wherein the discharge occurs. (Mockler-Florida) W74-01450

WATER POLLUTION IN LOUISIANA: AN AT-TEMPT AT CONTROL. I. R. Silverstein.

Loyola Law Review, Vol 18, No 3, p 734-745, 1971-1972 61 ref

Descriptors: *Louisiana, *Legislation, *Water pollution, *Water quality, Water quality standards, Pollutants, Legal aspects, Common law, Constitutional law, Judicial decisions, Law enforcement, Penalties (Legal), Economics, Com-

A bill introduced into the Louisiana state legislature is analyzed as to its chances for success as a curb on the pollution of state waters. Existing federal legislation is reviewed. Because of the federal government's refusal to enforce legislation regarding water pollution, the onus of enforce-ment is in the individual states. Furthermore, because of the vast extent of water resources in Louisiana, and the rapid industrialization now taking place there, water pollution in the state of Louisiana poses an especially dangerous threat unless controls are instituted immediately. The legislature restricted the prohibition of the proposed bill to discharges into public bodies of water. If the proposed bill had not been so restricted, the chances of its success in halting the discharge of pollution into the waters of the state would have been good. Even so, some merit is seen in the bill as the legislature has extended its authority over water pollution, and in doing so has hopefully abated the premature death that otherwise be suffered by Louisiana's bayous, streams, and marshlands. (Reed-Florida) W74-01451

IN RE SPRING VALLEY DEVELOPMENT (CHALLENGE TO ORDER OF ENVIRONMENTAL IMPROVEMENT COMMISSION DENYING DEVELOPMENT ALONG SIDE OF POND) For primary bibliographic entry see Field 06E.

SIERRA CLUB V. MASON (ACTION TO EN-JOIN DREDGING OF NEW HAVEN HARBOR). For primary bibliographic entry see Field 06E. W74-01456

A BILL TO ESTABLISH THE CANAVERAL NATIONAL SEASHORE IN THE STATE OF FLORIDA.

For primary bibliographic entry see Field 06E. W74-01457

FLORIDA POLLUTION STATUTE INFRINGES UPON EXCLUSIVE FEDERAL MARITIME LEGISLATIVE DOMAIN, THE AMERICAN WATERWAYS OPERATORS, INC. V. ASKEW, 335 F. SUPP. 1241 (M.D. FLA).
Journal of Maritime Law and Commerce, Vol 4,

No 1, p 163-168, October 1972.

Group 5G-Water Quality Control

Descriptors: *Statutes, *Judicial decisions, *Pollution, *Jurisdiction, Oil wastes, Vessels, Port authorities, Harbors, Legal review, Governmental interrelations, Competing uses, Water pollution

This case note presents a comprehensive discussion of the state of Florida's pollution statute as an infringement upon exclusive federal maritime legislative domain. In the subject case, a variety of plaintiffs challenged the statute's validity on several federal constitutional grounds. They con-tended that Florida sought to legislate substantive maritime law which, under the United States Constitution, is exclusively within the federal domain; that the Act violated the Commerce Clause, since it attempted to regulate interstate and foreign commerce; and, that certain parts of the Act violated the due process and equal protection provisions of the Fourteenth Amendment. The three judge federal court agreed with the first contention and declared the Florida statute null and void and without effect because it violated Article III, Section 2, Clause 3 of the U.S. Constitution. The court rejected the argument that the Florida Act was valid under the provision of the Federal Water Quality Improvement Act on the ground that Congress may not confer on the states authority to legislate within the admirality jurisdiction. (Mockler-Florida) W74-01460

THE PORTER-COLOGNE WATER QUALITY CONTROL ACT, AND RELATED WATER CODE SECTIONS (CONTAINING THE 1971 AMENDMENTS).
California State Water Resources Control Board.

Sacramento.

March 1972, 55p.

Descriptors: *California, *Legislation, *Water quality control, *Water resources development, Administration, Comprehensive planning, Conservation, Local governments, Regional develop-Water policy, Water resources, Wells, Well regulation. Waste water disposal.

The California state policy on water quality control consists of water quality principles and guidelines for long-range resource planning, water quality objectives for the planning of water resource development projects, and such other principles and guidelines deemed essential by the State Water Resources Board. The function and duties of the Board, as well as the means for establishing policies are stated in the Porter-Colgne Water Quality Control Act. A regional board is established for each of the nine regions into which the state is divided, and the duties of this board are specified. Each regional board is to formulate and adopt water quality control plans in conformity to the state policy. The regional board may prescribe requirements as to the nature of any proposed discharge, taking into consideration the conditions existing from time to time in the disposal area. The Act provides for the enforcement and implementation of regional board orders. The state board and the judiciary may review such orders. The state board is authorized to provide loans for the development of water reclamation facilities. The Act provides for the regulation of water and cathodic wells. The transportation and disposal of wastes is also covered by the Act. (Reed-Florida) W74-01461

CITY OF MONMOUTH V. ENVIRONMENTAL PROTECTION AGENCY (EPA SUED THE CITY TO PROHIBIT THE CITY FROM CONTINUING TO MAINTAIN A SEWAGE LAGOON SYSTEM WHICH WAS EMITTING NOXIOUS ODORS). For primary bibliographic entry see Field 06E. W74-01462

APPLICATION OF MATHEMATICAL. MODELLING TO WATER QUALITY MANAGE-

EASAMS, Camberley (England). For primary bibliographic entry see Field 05B. W74-01486

PHYSICAL SYSTEM MODELLING AS A TOOL IN WATER RESOURCE PLANNING, Department of the Environment, Ottawa (On-

For primary bibliographic entry see Field 02A. W74-01487

SUBSTANTIATION OF THE MAXIMUM PER-MISSIBLE CONCENTRATION OF ANP-2 COM-POUND IN WATER BODIES, (IN RUSSIAN), Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad (USSR).

Gig Sanit. Vol 37, No 2, p 14-17. 1972, Illus, (English summary).

Identifiers: *Amines, *ANP-2 compound, Cation collectors, *Maximum permissible concentration, Rabbit, Rat, Substantiation, Water purification,

ANP-2 (a cation collector in the amine series) at a concentration of 0.45 mg/1, produced no changes in the processes of purification of water bodies and was ineffective for warm-blooded animals (mice, rats and rabbits).--Copyright 1973, Biological Abstracts, Inc. W74-01581

PROTECTIVE FUNCTION OF THE FOREST IN AREAS OF WATERWORK RESERVOIRS, (IN CZECH),

Skola Zemedelska, zechoslovakia). Fakulta Lesnicka. For primary bibliographic entry see Field 04A. W74-01582

NITRATE REDUCTION IN SOILS: EFFECT OF SOIL MOISTURE TENSION, Louisiana State Univ., Baton Rouge.

For primary bibliographic entry see Field 02G. W74-01583

TALLAHALA CREEK LAKE, PASCAGOULA RIVER BASIN. MISSISSIPPI (FINAL ENVIRON-MENTAL IMPACT STATEMENT). Army Engineer District. Mobile, Ala For primary bibliographic entry see Field 04A. W74-01610

EARLY THOUGHTS ON PROSECUTING POL-Santa Clara, Univ., Calif.

K. A. Manaster.

Ecology Law Quarterly, Vol 2, No 3, p 471-492, Summer 1972. 55 ref.

Descriptors: *Illinois, *Water pollution control, *Legal aspects, Law enforcement, Judicial decisions, Governments, Water quality standards, Water law, Water policy, Administration, Water resources development, Legislation.

Reflections are presented of a former prosecutor who represented the people of Illinois in the beginning stages of enforcing the new environmental laws of that state through governmentsponsored litigation. General principles and policies involved and the concerns that prosecutors should bear in mind are discussed. The article is intended as a partial how-to-do-it manual for a pollution prosecution office at any level of government The emphasis is upon the principal tools identified in the state of Illinois thus far for use by government lawyers in combating polluting. No systematic philosophy or structural scheme is offered. The attorney must depend primarily upon the statutory and judicial statements in his own jurisdiction. (Mockler-Florida) W74-01613

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972. Conference Report No 92-1465 -- U.S. House of Representatives, 92d Cong, 2d Sess, September 28, 1972. 156 p, 3 tab.

Descriptors: *Legislation, *Water pollution control, *Water quality standards, *United States, Legal aspects, Comprehensive planning, Jurisdiction, Economics, Water policy, Water law, Permits, Water utilization, Research and develop-

The objectives of the amendments are to restore and maintain the chemical, physical, and biologi-cal integrity of the Nation's waters. The amendments contain sections concerning research and related programs, comprehensive plans for water pollution control, interstate cooperation and uniform laws, grants for research ment, pollution control in the Great Lakes, grants for construction of treatment works, standards and enforcement, permits and licenses. In addition to the full text of the 1972 amendments, the docu-ment contains a joint House-Senate Conference Report. The Senate bill, House amendment, and the substitute measure proposed by the con-ference are included. While many of the amendments remain substantially the same, others were changed to a considerable extent by the conference committee. This is especially evident in title v, which contains the general provisions dealing with emergency powers, citizen suits, employee protection, and administrative procedure and judicial review. (Mockler-Florida) W74-01615

DESIGNATING A SEGMENT OF THE ST. CROIX AS PART OF WILD AND SCENIC RIVERS SYSTEM.

For primary bibliographic entry see Field 06E. W74-01619

THE MANAGEMENT OF BAY AND ESTUARINE SYSTEMS IN THE TEXAS COASTAL ZONE, PHASE II. Texas Univ., Austin. Div. of Natural Resources and the Environment.

Prepared for Office of the Governor, State of Texas, March 1973. 105 p, 5 fig, 5 tab, 160 ref, 2 ap-

Descriptors: *Estuarine environment, *Texas, *Bays, *Coastal areas, Bodies of water, Oceans, Coastal engineering, Economics, Environmental effects, Resources management, Water quality control, Comprehensive planning.

Identifiers: *Coastal zone management.

The major emphasis is on those activities of man that may detrimentally affect coastal environmen-tal units and resources. Hypothetical examples are given to indicate the economic and social consequences arising from the implementation of management tools to lessen detrimental environmental impact. The conclusions outlined present positive steps needed to develop an effective Texas coastal management program. Many policy decisions which will affect coastal zone activities must be made within the near future with inadequate quantitative, economic, social, and environmental criteria. Each coastal environmental unit was evaluated in terms of its natural capability to sustain human use that affects its physical, hydrological, geological, chemical, and biological properties, and is grouped in an appropriate resource capability class. (Mockler-Florida) W74-01620

WATER RESOURCES PLANNING—Field 06

Evaluation Process—Group 6B

TALLULAH CREEK WATERSHED (LONG CREED PORTION) GRAHAM COUNTY, NORTH CAROLINA (FINAL ENVIRONMEN-TAL IMPACT STATEMENT). Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 04D. W74-01621

A COST-EFFECTIVENESS STUDY AND ANALYSIS OF MUNICIPAL REFUSE DISPOSAL

Arizona Univ., Tucson. For primary bibliographic entry see Field 05E. W74-01631

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

SIMULATING THE BEHAVIOR OF A MULTI-UNIT, MULTI-PURPOSE WATER-RESOURCE SYSTEM.

Harvard Univ., Cambridge, Mass.

M. M. Hufschmidt.
In: Symposium on Simulation Models: Methodology and Applications to the Behavioral Sciences, South-Western, Cincinnati, Ohio, 1963. A. C. Hog-gatt and F. E. Balderston, editors. p 203-220, (1963) 2 fig, 1 tab.

Descriptors: *Water resources, *Methodology, *Simulation analysis, *Idaho, Cost-benefit analy-

Identifiers: *Clearwater River (Idaho), Harvard Water Resources Program.

Results are summarized of simulation studies, under the Harvard Water Program, of a model river basin system consisting of 4 reservoirs, 2 hydro-power plants, an irrigation distribution system and a flood damage center, based on the Clearwater River Basin in Idaho. Components of the simulation problem included 12 decision variables, and functions for capital and annual opera-tion, maintenance and replacement cost, benefits and losses related to the system units. Objective of the simulation was the maximization of the present value of the 50-year stream of gross annual irriga-tion, energy and flood control benefits less annual operation, maintenance and replacement costs, discounted at a selected interest rate, less capital costs. The constraints, operating procedure, and manner of determining the optimal system design. by examining the net-benefit response surface, are discussed in detail, as is the overall solution strategy. The most striking feature of the net-benefit response surface of the simulation was its complexity. Either random or uniform grid sampling may be used early in the analysis to indicate the general configuration of the response surface and to provide starting points for a more detailed examination of parts of the surface with high net benefits. Prior to this, major system variables should be identified, and discontinuities and constraints spotted. Once the general region (s) of high net benefits have been identified, systematic sampling should be used to find the peak (s). Changes and extensions of the model are suggested based on its use in the study. (Edwards-North Carolina) W74-01468

APPLICATION OF MATHEMATICAL MODELLING TO WATER QUALITY MANAGE-

EASAMS, Camberley (England).
For primary bibliographic entry see Field 05B.
W74-01486

PHYSICAL SYSTEM MODELLING AS A TOOL IN WATER RESOURCE PLANNING,
Department of the Environment, Ottawa (OnFor primary bibliographic entry see Field 02A. W74-01487

FOR IRRIGATION HYBRID MODEL PLANNING USING CHANCE CONSTRAINED PROGRAMMING AND HYDROLOGIC SIMU-LATION.

Norwegian Inst. of Urban and Regional Research,

For primary bibliographic entry see Field 04B. W74-01488

ON THE OPTIMAL OPERATION OF GROUND-WATER BASINS: A CALCULUS OF VARIA-TIONS APPROACH,

Illinois Univ., Urbana. Dept. of Geology For primary bibliographic entry see Field 04B. W74-01489

A LINEAR PROGRAMMING APPROACH TO FLOODPLAIN LAND USE PLANNING IN URBAN AREAS, Arizona Univ., Tucson. Dept. of Agricultural

Economics.

For primary bibliographic entry see Field 03D. W74-01490

ECONOMICS OF RESOURCE USE ON SAMPLE FARMS OF CENTRAL GUJARAT, Indian Inst. of Management, Ahmedabad. For primary bibliographic entry see Field 03F. W74-01491

6B. Evaluation Process

REPORT OF ATTITUDES AND OPINIONS OF RECREATIONISTS TOWARDS WILD AND SCENIC RIVERS: A CASE STUDY OF THE ST. JOE RIVER,

Idaho Univ., Moscow. Water Resources Research

K. Christophersen.

Available from the National Technical Information Service as PB-225 166/8, \$3.75 in paper copy, \$1.45 in microfiche. Scenic Rivers Study Report No. 9, October 1973. 66 p, 1 fig, 21 tab. OWRR C-3342 (No 3718) (3).

Descriptors: *Attitudes, *Idaho, *Wild rivers, River basin development, Wild rivers act, *Recreation.

Identifiers: *National Wild and Scenic Rivers System. *St. Joe River (Idaho).

Information was obtained from recreationists interviewed along the St. Joe River, regarding their attitudes and opinions of the proposed inclusion of the river in the National Wild and Scenic Rivers System. A sample of 350 randomly selected recreationists were interviewed. They were stratified into resident and non-resident categories for analytical purposes. Results of the survey revealed that large majorities of both resident and non-resident respondents were strongly or mildly in favor of including the entire river in the Wild and Scenic Rivers System. Their inclusion preferences were largely consistent with responses indicating a general desire to leave the area sentially as it is with little or no further development. In ranking recreational participation activities and other recreational features, the 'scenic beauty' category received the most 'excellent' votes. Few respondents gave any of the categories a 'poor' rating. The majority of resident and non-resident recreationists indicated a willingness to pay entrance fees if the inclusion of the river in the tional Wild and Scenic Rivers System necessitated the imposition of user charges.

SURFACE-WATER RESOURCES OF THE USSR THEIR CHANGE RESULTING FROM HUMAN ECONOMIC ACTIVITY (RESURSY POVERKHNOSTNYKH VOD SSSR I IKH IZ-MENENIYE POD VLIYANIYEM KHOZYAYST-VENNOY DEYATEL'NOSTI), Gosudarstvennyi Gidrologicheskii Institut, Lenin-

grad (USSR). For primary bibliographic entry see Field 04A.

W74-01133

ENGINEER'S REPORT FOR SOUTH VALLEY WATER SYSTEM.

Herkenhoff (Gordon) and Associates, Albuquerque, N. Mex.

Available from NTIS, Springfield, Va 22151 as COM 73-10354 Price \$3.00 printed copy; \$1.45 microfiche. Engineers Contract Report, Prepared for Four Corners Regional Commission and Bernallillo County Board at County Commis-sioners, March 1972. 71 p, 5 map, 25 tab.

Descriptors: *Water pollution control, *Urbanization, *Ilrban hydrology, *Water supply, *New Mexico, Hydrologic data, Water analysis, Reviews, Evaluation, Water pollution sources, Septic tanks, Planning, Hydraulic structures, Costs, Economics, Social aspects, Water supply, Projections, Water demand.
Identifiers: *Bernalillo County (N Mex), Water

system plans.

The purpose is twofold: (1) to present a comprehensive Water System Master Plan for the South Valley area of Bernalillo County, New Mexico, together with the data and analyses from which that plan was derived; and (2) to define a portion of the system which is economically feasible to construct at this time, together with the data and analyses from which that definition was determined. The growing problem of domestic water supply for the South Valley area has been recognized for some years, particularly by those public health agencies concerned with contamination of water supplies. The potential for bacterial contamination of the shallow groundwater is increasing as urbanization progresses. This has led to more stringent regulations governing well con-struction and the location and design of septic tanks. Based on the analyses it was deemed feasible to construct a water system which is an expansion of the existing city of Albuquerque system to serve that area of the southwest valley north of Rio Bravo Blvd. and south of the existing city limits. The system would also serve the existing Adobe Acres area south of Rio Bravo on Isleta Blvd. (Woodard-USGS) W74-01382

PROSPECTS FOR THE USE AND CONSERVA-TION OF WATER RESOURCES IN THE USSR (PERSPEKTIVY ISPOL'ZOVANIYA I OK-HRANY VODNYKH RESURSOV SSSR), Moscow State Univ. (USSR). Chair of Hydrology.

V. D. Bykov, and G. P. Kalinin.

Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 5, p 3-7, September-October 1971.

Descriptors: Water resources, *Water utilization, *Water conservation, *Water resources development, *Planning, Water requirements, Water supply, Water demand, Runoff, Regulation. Identifiers: *USSR.

Water resources of the USSR and their areal distribution are examined, and measures to regulate water use in the USSR in 1971-75 are described. Distribution of annual runoff by Union Republics and Economic Regions is tabulated, and problems in water-resources planning and development are discussed. (Josefson-USGS)

Field 06-WATER RESOURCES PLANNING

Group 6B—Evaluation Process

SIMULATION OF WATER RECREATION USERS' DECISIONS,

Kansas Univ., Lawrence. School of Business. For primary bibliographic entry see Field 06D. W74-01464

AND NOT A DROP TO DRINK: WATER RESOURCES PLANNING AND ADMINISTRA-TION,

Harvard Univ., Cambridge, Mass. For primary bibliographic entry see Field 06E. W74-01465

THE ROLE OF UNIVERSITIES IN WATER RESOURCES EDUCATION: THE SOCIAL

North Carolina Univ., Chapel Hill. M. M. Hufschmidt.

Water Resources Research, Vol 3, No 1, p 3-9, First Quarter 1967.

Descriptors: *Water resources, *Water management, Economics, Education.

Identifiers: *Social sciences, *Interdisciplinary approach, *Multidisciplinary.

The specialist education is examined of graduates who will be involved in the water resources field with respect to the future role of the social sciences. Education for water resources is an area of specialization which imposes rigorous constraints on education possibilities. Participation of university social science departments in such education is comparatively small. This involvement is reviewed, particularly with reference to economics, law, geography, political science and public administration. Unexploited opportunities in the application of the insights and methods of these fields exist, including multidisciplinary involvement through water resources topics for theses, service courses in social sciences for natural science and engineering students, and social science participation in seminars oriented toward water resources. A more complex form of organizing such involvement would be the studies program approach, consisting of a group of courses from numerous disciplines with a common theme or focus. An alternative would entail the long-term interdisciplinary collaboration of social and natural scientists and engineers in a integrated series of graduate courses and research seminars. These would deal with water resources problems, issues, and policies. Relevant areas and course topics within the social sciences are proposed. (Edwards-North Carolina) W74-01467

SIMULATING THE BEHAVIOR OF A MULTI-UNIT, MULTI-PURPOSE WATER-RESOURCE

SYSTEM, Harvard Univ., Cambridge, Mass. For primary bibliographic entry see Field 06A. W74-01468

FUNCTIONAL WATER AND SEWERAGE PLAN AND PROGRAM.

LBC and W Associates, Columbia, S.C. For primary bibliographic entry see Field 05D. W74-01469

RIVER BASIN PLANNING IN THE UNITED

Office of the Chief of Engineers (Army), Washington, D.C. Civil Works Planning Div. E. W. Weber, and M. M. Hufschmidt.

In: Natural Resources: Energy, Water and River Basin Development; U. S. Papers Prepared for the UN Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas. February, 1963. Geneva, Switzerland. Vol 1, p 299-312, (1963) 26 ref. Descriptors: *Water resources. *Planning, *Methodology, Benefit-cost analysis, History, *River basin development, United States. Identifiers: *Developing nations.

The basic concept of integrated river-basin planning and an idealized methodology for such planning, the U. S. experience in planning during the past 30 years, and some important implications for the developing areas of the world are presented. Methodologically, river basin planning consists of: (a) setting broad objectives for development, (b) establishing criteria for formulation of specific plans, (c) formulating the optimal river-basin plan and development schedule and (d) reviewing proposed river basin plan or alterna-tives. Step C breaks down into: (1) identifiying and measuring the physical, economic, social problems, and requirements of the region; (2) identifying and measuring various opportunities for control and development of water and related land resources; and (3) formulating an optimal water development plan, including a development schedule. Benefit-cost analysis has been highly developed for these purposes. The U. S. experience is reviewed. Some conclusions are: (a) goals and objectives for river basin development should be clearly stated by top policy-makers at the outset of planning; (b) regional or local projections of economic activity or targets for economic development should be derived from established national ones; (c) successful planning hinges on the manner in which the task is set up; (d) benefitcost analysis is useful in formulating and evaluating economically optimal plans; (e) river basin development planning should be considered in the context of total investment planning; (f) coordinating arrangements with other government units will be needed; (g) a broad, interdisciplinary-team approach is essential; and (h) programs for systematic and sustained collection and analysis of basic data are essential. (Edwards-North Carolina) W74-01472

RELATING COMPREHENSIVE SEWER AND WATER PLANS TO THE COUNTY LAND USE PLAN. GOALS, POLICIES AND STANDARDS. Chenango County Planning Board, Norwich, N.Y. For primary bibliographic entry see Field 05D. W74-01473

COMPREHENSIVE WATER AND SEWER PLAN, RANDOLPH COUNTY, ILLINOIS. Southwestern Illinois Metropolitan Area Planning Commission, Collinsville. For primary bibliographic entry see Field 05D. W74-01474

FLOODLAND AND SHORELAND DEVELOP-

Southeastern Wisconsin Regional Planning Commission, Waukesha. For primary bibliographic entry see Field 04A. W74-01483

A GROWING COMMUNITY: 1973 UPDATE, (LEXINGTON, KENTUCKY).
Lexington and Fayette County Planning Commission, Lexington, Kv. For primary bibliographic entry see Field 05D. W74-01484

SKETCH DEVELOPMENT PLAN, CHAMBERS

COUNTY, ALABAMA.

East Alabama Regional Planning and Development Commission, Anniston. For primary bibliographic entry see Field 05D. W74-01485

ECONOMICS OF RESOURCE USE ON SAMPLE FARMS OF CENTRAL GUJARAT, Indian Inst. of Management, Ahmedabad.

For primary bibliographic entry see Field 03F.

FISHERIES AND FISH CULTURE IN ISRAEL IN 1971.

Laboratory for Research Fis. Dis., Nir David (Israel). S. Sarig.

Bamidgeh, Vol 24, No 3, p 55-75, 1972, Illus. Identifiers: *Cultures, Fish catch, *Fisheries, *Israel.

The total fish catch for 1971 showed a steady increase over that of 1970 and 1969, but the per capita consumption remained almost the same, at 10.1 kg. Statistics are given for the various sources of fish: imports, Lake Kinereth fishery, pond culture, etc. Increases or decreases of the catch of various fish species are given.—Copyright 1973, Biological Abstracts, Inc. W74-01570

REGIONAL WATER RESOURCES STUDIES --A SPANISH EXPERIENCE, Garaghty and Miller, Port Washington, N.Y. For primary bibliographic entry see Field 04B. W74-01622

IMPACT OF IRRIGATION INVESTMENTS ON REGIONAL AND URBAN DEVELOPMENT, Resources for the Future, Inc., Washington, D.C. P. R. Crosson.

Paper presented at Internation Symposium on Water Resources Planning, Mexico December 1972. 63 p, 1 fig, 4 tab, 44 ref.

Descriptors: *Irrigation design, *Economic impact, *Urbanization, *Regional economics, *Irrigation programs, Management, Investment, Return (Monetary), Economics, Community development, Land use, *Mexico.
Identifiers: *Sonora (Mexico).

Planning of irrigation projects usually stops with the calculation of direct benefits and costs, and the ranking of projects according to cost-benefit ratios. Irrigation investments, however, may have repercussions of major importance that go far beyond the direct increase in agricultural production resulting from them. By improving the productivity of resources employed in agriculture, irrigation investments can trigger fundamental changes in the economic structure of the region in which they are placed. The increase in agricultural productivity improves the region's competitive position in national and international markets, thereby attracting new resources into the region's agricultural sector to take advantage of expanding economic opportunities. The increased quantity and productivity of agricultural resources in turn generates rising demands for urban supplied goods and services, thus stimulating urban growth in the region. Investment in irrigation thus can be viewed no an instrument of regional and urban develop-ment policy. The theoretical basis for this argu-ment is developed and applied to the analysis of an arid location in Sonora, Mexico. (Muller-Arizona) W74-01625 as an instrument of regional and urban develop-

EDUCATIONAL PROGRAMS FOR LAND AND WATER RESOURCES DEVELOPMENT AND MANAGEMENT,

Arizona Univ., Tucson. D. D. Evans.

Paper presented at International Symposium of Water Resources Planning, Mexico City, December 1972, 18 p.

Descriptors: *Schools (Education), *Training, *Education, Professional personnel, Colleges, *U-niversities, Technology, Information exchange, Social participation, Scientific personnel, Manage-

Land and water are basic resources in every country. Wise management of these resources, whether for urban, agricultural, recreational, or other uses, may be the critical factor in determining the level of prosperity attained and maintained by the citizenry. This is especially true for coun-tries which have large demands placed upon limited resources, such as arid lands in relation to water. Educational programs must be considered for all levels. Precollege students should acquire an appreciation for these critical resources. Undergraduate and graduate programs should be designed to meet the diverse demand for required expertise. Continuing education programs are needed for professionals and nonprofessionals who have responsibilities for guarding and managing these resources. With the rapid development of technology and methodologies, the half-life of acquired knowledge is now only a few years, so educational programs must be continually up-dated. The University of Arizona, in Tuson, is used as an example of how one educational institution deals with resource development and management education. (Muller-Arizona)

WATER RESOURCES PLANNING MOZAM-BIQUE (LA PLANIFICATION DES RESOURCES EN EAU AU MOZAMIQUE), Servicos Hidraulicos, Lourenco Marques

(Mozambique).

C. D. de Ataide Fonseca.

Paper presented at International Symposium on Water Resources Planning, Mexico City, December 1972, 25 p, 4 fig.

Descriptors: Water resources, *Water allocation Pescriptors: "Maer resources," water anocation (Policy), "Planning, "Management, "Africa, Water resources development, Water requirements, Water demand, Water policy, Water supply development, Administration, Priorities, Regional development, Allotments.

Identifiers: "Mozambique.

Mozambique is characterized as an area of hot, oceanic temperature regime, with temperate plateau lands, predominantly dry and semiarid, with moderately humid coastlands. Precipitation ranges between 90 and 3,600 millimeters per year, with an average of about 968 mm. The annual average of 8 x 10 to the 10th power cubic meters of surface water, flowing principally in the Zambeze and Limpopo Rivers, is primarily utilized on site, rather than through a system of diversions. Although capabilities for hydroelectric power generation have reached 2.5 x 10 to the 8th power kwh in 1970, and some diversion projects exist, water distribution and optimum utilization remain a principal planning concern for this growing country. Mozambuque has reached a phase i development where the current and historic lack of water resource management is no longer acceptable, and definite planning measures must now be initiated which develop and allocate water resources in a manner that recognizes future expansion. Principal planning problems facing water administrators in Mozambique today are (1) determination of socio-economic water usage priorities, (2) uniform development of water resources throughout the country, and (3) harmonious management of international rivers. (Muller-Arizona) W74-01629

VALUATION OF VISUAL-CULTURAL BENEFITS FROM FRESHWATER WETLANDS IN MASSACHUSETTS, Massachusetts Univ., Amherst. Dept. of Agricul-

tural and Food Economics. T. R. Gupta, and J. H. Foster.

Journal of the Northeastern Agricultural Economics Council, Vol. 2, No. 1, p 262-263, Summer, 1973. 3 tab, 20 ref. OWRR B-023-MASS (5), 14-31-0001-3596.

Descriptors: *Wetlands, *Economics, Aesthetics, Northeast United States, *Massachusetts, *Recreation demand, Evaluation, Land use, *Social values, Attitudes. Identifiers: Open spaces, *Visual cultural values.

The study has suggested an alternative to the willingness to pay' approaches to measuring the social value of natural open space and recreational resources. The method combines determination and measurement of the physical qualities of the resource by landscape architects with the mea-surement of value as expressed by the political system. It is illustrated by application to freshwater wetlands in Massachusetts. Wetlands with the highest visual-cultural values have a value, for this public purpose alone, of about \$5,000 per acre. Based on a rating system developed by landscape architects, other wetlands will have a lower value architects, other wetlands will have a lower value for this purpose. Although this approach has cer-tain weaknesses, it seems to produce valid dollar figures on which public purchase or other preser-vation decisions can be based. (Larson-Massachusetts)

CONCEPT-SCALE INTERACTION WITH THE SEMANTIC DIFFERENTIAL TECHNIQUE Virginia Polytechnic Inst. and State Univ, Blacksburg. Dept. of Sociology. D. L. Klemmack, and J. A. Ballweg. Journal of Psychology Vol 84, p 345-352, 1973. 1 table. OWRR A-038-VA (3).

Descriptors: *Recreation facilities, *Electric power, Water resources, *Attitudes, Social aspects, Psychological aspects, *Land use, Evaluation, *Social values. Identifiers: Semantic differential technique, Concent-scale interaction.

The semantic differential technique is designed to serve as a method for measuring 'meaning.' It is a multidimensional rating scale based upon the assumption that words represent things. Basically, the semantic differential technique can be considered as a combination of scaling procedures and controlled associations. The subject is provided with a concept to be differentiated as well as a set of adjectival scales with which to do it. The respondent is asked to select a number from one to seven that most closely describes his interpretation of the association between the concept and the adjectival pair. In this study, adult response in an interview setting were asked to evaluate two concepts—use of a lake (a) as a source of electric power and (b) as a recreation area--by means of eight seven-point scales. Results indicate con-siderable concept-scale interaction, suggesting that Osgood's interpretation of the semantic differential may be restricted by both technique of data collection and subpopulation. Respondent hostility might be an intervening variable. The semantic differential technique appeared to yield a preliminary evaluation of the two concepts, suggesting its use as an indicator of orientation. W74-01644

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

THE IMPACT OF WATER POLLUTION ABATEMENT ON COMPETITION AND PRICING IN THE ALABAMA TEXTILE INDUSTRY, Auburn Univ., Ala. Water Resources Research Inst.

For primary bibliographic entry see Field 05G. W74-01101

gineering.

RELATIONSHIP OF PUMPING LIFT TO ECONOMIC USE OF GROUNDWATER FOR IR-Idaho Univ., Moscow, Dept. of Agricultural EnFor primary bibliographic entry see Field 04B. W74-01120

A COST-EFFECTIVENESS STUDY AND ANAL-YSIS OF MUNICIPAL REFUSE DISPOSAL SYSTEMS.

Arizona Univ., Tucson. For primary bibliographic entry see Field 05E. W74-01631

VALUATION OF VISUAL-CULTURAL BENEFITS FROM FRESHWATER WETLANDS IN MASSACHUSETTS.

Massachusetts Univ., Amherst. Dept. of Agricul-tural and Food Economics. For primary bibliographic entry see Field 06B. W74-01643

6D. Water Demand

AGRICULTURAL WATER DEMAND IN NORTH CAROLINA: PHASES I AND II,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering. R. E. Sneed, and R. S. Sowell.

Available from the National Technical Information Service as PB-225 130/4, \$4.75 in paper copy, \$1.45 in microfiche. Water Resources Research Inst. of the University of North Carolina. Rept. No. 83, September 1973. 142 p, 3 fig, 33 tab, 45 ref, 2 append. OWRR A-057-NC (1) 14-31-0001-3833.

Descriptors: *Water demand, Water management (Applied), Rate of application, Crop production, 'Arpinedy, Kate of application, Crop production, 'Irrigation efficiency, *Water requirements, Irrigation practices, *North Carolina, *Computer models, *Water utilization. Identifiers: Pitt County (NC).

A computerized water use model is developed and which determines the total water requirements for a given level of agricultural activity. A separable component of the model calculates both the aggregate water demands and the net economic return for alternative irrigation policies and cropsoil combinations. Input data include soils types and characteristics taken from soil surveys; crop acreage, timing, rooting depths, water require-ments, and responses (yield) to irrigation; daily rainfall records; selling prices of crops; and irriga-tion costs. Output includes per acre and aggregate irrigation water requirements for each crop-soil combination for each time period; production levels, value of the production, cost of irrigation, and the net return to irrigation; and output data for alternative irrigation policies. (McJunkin-North W74-01112

WATER RESOURCES OF THE URAL AREA AND BASIC PROBLEMS IN THEIR COMPLEX USE (VODNYYE RESURSY URALA I OSNOV-NYYE PROBLEMY IKH KOMPLEKSNOGO ISPOL'ZOVANIYA), For primary bibliographic entry see Field 03E. W74-01135

ARIZONA'S COMING DILEMMA: WATER SUPPLY AND POPULATION GROWTH, For primary bibliographic entry see Field 04A. W74-01452

SIMULATION OF WATER RECREATION USERS' DECISIONS,

Kansas Univ., Lawrence. School of Business. J. E. Gaumnitz, R. L. Swinth, and J. O. Tollefson Land Economics, Vol 49, No 3, p 269-277, August,

Descriptors: *Recreation demand, Water allocation (Policy), Recreation facilities, Demand

Field 06-WATER RESOURCES PLANNING

Group 6D-Water Demand

schedule (Recreation), Use rates, *Decision mak-

Identifiers: *Water-based recreation selection process, *Discrimination nets.

The aim was to demonstrate the feasibility and merit of identifying the discrimination net by which an individual processes information on facility attributes when he makes a decision on water recreation usage. Individual discrimination nets were constructed by a process of trial, modification, and verification of a stable decision process involved with selecting 10 water recreation sites (sample size ± 17). Four primal conditions for usage were identified: (1) it must be a nice day; (2) the lake must be within 40 miles; (3) cost of entry cannot exceed \$2.50; and (4) there must be picnic facilities. From the initial study, it was concluded that individuals can articulate their discrimination nets, discrimination nets are stable over time (initial check back period was 1 month), and that it would be feasible to obtain discrimination nets from large numbers of people, in terms of the time necessary for an interview and the necessary amount of training for an interviewer. Potentially, discrimination nets are a tool for analyzing the choices and preferences of a population to provide the planner with projections of usage rates and better explanations of the relationships between configuration of water recreation facili-ties and usage. (Hoffman-North Carolina) W74-01464

WATER MASTER PLAN. EUGENE-SPRIN-GFIELD URBANIZING AREA. Edmundson, Kochendoerfer, and Kennedy, Port-

land, Oreg.; and Daniel, Mann, Johnson, and Mendenhall, Portland, Oreg. For primary bibliographic entry see Field 03D.

W74-01479

UTILITY PROVISIONS ANALYSIS FOR EAST CENTRAL FLORIDA.

Reynolds, Smith and Hills, Jacksonville, Fla.

Final report prepared for East Central Florida Regional Planning Council, Tallahassee. September, 1965. 126 p, 9 fig, 29 tab, 2 append.

Descriptors: *Planning, *Water supply, Descriptors: "Planning, "Water supply, Sewerage, "Florida, Water quality control, Ur-banization, Administration, Financing, Institu-tions, Costs, Eutrophication, Groundwater, Water demand, Legislation, "Utilities, "Treatment facilties.

Identifiers: Utility expansion, Utility districts, Cape Kennedy (Fla).

A general, planning study is presented of problems and possible solutions related to water supply and sewerage systems for East Central Florida. The region includes the Cape Kennedy space center and is in a period of rapid urban development. The report focuses on the current status of water and sewerage systems in the area plus the water quality of lakes and streams, future water supply and sewerage needs, and the administration and financing of the expansion of these systems. Water supplies in coastal areas of the region are generally not sufficient to meet future needs and water will have to be imported from inland sources. Desalinization is not considered to be economically feasible. Water quality and fertilization of local lakes and streams are significant problems due to a lack of public treatment plants and a great number of small, inefficient private wastewater disposal systems. Wastewater systems must be expanded and consolidated and 90% removal of BOD required. However, utility systems expansion is severely constrained by or ganizational structure and financing problems. Florida law should be modified to allow countywide utility districts and intercounty utility func-tions; service rates should be raised to help finance system extensions. (Elfers-North Carolina)

W74-01480

AVAILABILITY OF FRESH WATER IN THE EAST CENTRAL FLORIDA PLANNING RE-GION.

Aase (George) and Associates, Inc., Tallahassee,

Final Report prepared for East Central Florida Regional Planning Council, Tallahassee, April 1965. 162 p, 4 append, 22 fig, 18 tab, 113 ref.

Descriptors: *Water supply, *Regional analysis, *Florida, *Data collections, Water resources development, Water sources, Water quality, Groundwater, Water storage, *Water demand, Ur-

banization, Artesian wells.
Identifiers: *St. Johns River Basin (Fla), *Cape Kennedy (Fla), Brevard County, Four River Basins Project.

A summary is presented of available water resource data including the total available fresh water in the region, which includes Cape Kennedy, the quality of the water resources, locations of potential future water supplies, water problems in the region, and possible solutions to the problems through 1980 with a projected population of approximately 1.6 million. The two main river basins in the region are the St. Johns and the Kissimmee. Much of the region is dotted with lakes, swamps, and marshes and has adequate water supply resources; however, the coastal areas, particularly Brevard County which is experiencing the most rapid urbanization, have limited fresh water supplies. Some of the possibilities for additional water supplies include the increased use of surface water in the St. Johns basin via several proposed storage reservoirs, the increased use of artesian water based on the Four River Basins Project which would provide reservoirs and other control works to create and enhance large groundwater recharge areas, salt water conversion, reuse of wastewater, and the suppression of evaporation. Recommendations include development of a water management plan with development of a broad regional plan for overall water management practices and procedures; consideration of development of a regional or multi-county system of water supply and distribution; evaluation of use saline irrigation water; adoption of a well drilling code; expansion of treatment facilities to control pollution; possible construction of salt water barriers in coastal canals; careful regulation of existing artesian water supplies; and use of drainage and land use controls to protect water supplies. Methodology and data limitations are ex-plained in Appendix I. (Elfers-North Carolina) W74-01481

6E. Water Law and Institutions

INTERNATIONAL SCIENTIFIC AND TECHNI-CAL COOPERATION IN THE FIELD OF WATER PROBLEMS (MEZHDUNARODNOYE NAUCHNO-TEKHNICHESKOYE SOTRUD-**NICHESTVO** OBLASTI

PROBLEM), Akademiya Nauk SSSR, Moscow. Institut Vod-N. V. Somov

Vodnyye Resursy, No 2, p 163-171, 1973.

Descriptors: *Water resources development, *Regional development, *Water utilization, *Foreign projects, *Foreign countries, Governments, International Hydrological Decade, Organizations. Identifiers: *USSR, Council of Mutual Economic

Present state and prospects of development of Soviet international cooperation in the field of water problems are reviewed. Emphasis is placed on Soviet scientific and technical ties with socialist countries (including member nations of the Council for Mutual Economic Aid) and on Soviet economic and technical assistance to the developing countries of Asia, Africa, and Latin America. (Josefson-USGS)

HEAVY METALS IN WASTEWATER AND TREATMENT PLANT EFFLUENTS, Interstate Sanitation Commission, New York. For primary bibliographic entry see Field 05A.

CONSOLIDATION OF IRRIGATION SYSTEMS: PHASE 1, ENGINEERING, LEGAL, SOCIOLOGICAL CONSTRAINTS A AND/OR FACILITATORS, Colorado State Univ., Fort Collins. Dept. of

Agricultural Engineering. For primary bibliographic entry see Field 03F.

W74-01367

INVENTORY AND EVALUATION OF INFOR-MATION ON DELAWARE BAY, VOLUME 2. Natural and Historic Resource Associates, Philadelphia, Pa.

Available from NTIS, Springfield, Va 22151 COM73-10520 Price \$3.00 printed copy; \$1.45 microfiche. Delaware College of Marine Studies, Sea Grant report, November 1972. 236 p, 12 tab, 199 ref. Sea Grant No 1-35377.

Descriptors: *Delaware River, *Delaware River Basin Commission, *Bays, *Land use, *Regulation, Legal aspects, Management, History, Human population, Reviews, Evaluation, Dredging, Water pollution control, Water supply, Recreation, Hydroelectric power, Commercial fishing, Wetlands, Conservation, Harbors, Estua-

Identifiers: *Delaware Bay area.

This study describes the history, land use, and legal mechanisms which operate in the tideland region of the lower Delaware Bay. It traces the development of important legal precedents which involve the possession and use of property along the Bay, and examines existing and proposed ownership and land use patterns. The land area under scrutiny includes the tidelands, from Lewes north to the border of Kent and New Castle Counties in Delaware, and Cape May and Cumberland Counties in New Jersey. The most important laws and regulations which affect the Bay and its borders are summarized. In addition to considering Federal, interstate, state, county or municipality regulations, the willingness of the various authorities to use the legal means available to them to regulate changes in the Bay environment is discussed. (Woodard-USGS) W74-01369

THE SHIPOWNER AND OIL POLLUTION LIA-BILITY, For primary bibliographic entry see Field 05G. W74-01447

VIRGINIA NATURAL RESOURCES LAW AND THE NEW VIRGINIA WETLANDS ACT, For primary bibliographic entry see Field 02L. W74-01448

MARINE POLLUTION: A CRITIQUE OF PRESENT AND PROPOSED INTERNATIONAL AGREEMENTS AND INSTITUTIONS--A SUG-GESTED GLOBAL OCEANS' ENVIRONMEN-TAL REGIME, San Francisco Univ., Calif. For primary bibliographic entry see Field 05G.

WATER RESOURCES PLANNING—Field 06

Water Law and Institutions—Group 6E

THE INTERSTATE WATER POLLUTION COM-PACT-PAPER TIGER OR EFFECTIVE REGU-LATORY DEVICE, Oak Ridge National Lab., Tenn.

For primary bibliographic entry see Field 05G. W74-01450

WATER POLLUTION IN LOUISIANA: AN AT-TEMPT AT CONTROL,
For primary bibliographic entry see Field 05G. W74-01451

ARIZONA'S COMING DILEMMA: WATER SUPPLY AND POPULATION GROWTH, For primary bibliographic entry see Field 04A. W74-01452

IN RE SPRING VALLEY DEVELOPMENT (CHALLENGE TO ORDER OF ENVIRONMEN-TAL IMPROVEMENT COMMISSION DENYING DEVELOPMENT ALONG SIDE OF POND).

300 A.2d 736-755 (Maine 1973).

Descriptors: *Maine, *Judicial decisions, *Environmental effects, *Legal aspects, Public health, Comprehensive planning, Land use, Statutes, Regulation, Project planning, Water law, Legisla-

Action was brought by plaintiff subdivider challenging the State Environmental Improvement Commission's order denying the subdivider the right to proceed with its development of a 92-acre tract along one side of a pond until such time as the subdivider had made proper application to the Commission and had received the Commission's approval. The subdivider appealed on the grounds the statute involved was unconstitutionally vague and a violation of the equal protection clause. The appeals court held for the Commission, stating that the notice requirement of the statute involved that the notice requirement of the statute involved is a reasonable exercise of the police power, is not unconstitutionally vague, and does not deny the equal protection of the law. Moreover, the court emphasized that the use of the word 'commercial' in the statute was intended to describe the motivation for the development and not the type of activity to be performed on the property after it is developed. (Mockler-Florida) W74-01454

OPERATION OF WATERCRAFT. Ind. Admin. Rules and Reg. Ann. secs (68-865)-5 thru (68-865)-7 (Supp. 1970).

Descriptors: *Indiana, *Legal aspects, *Boating regulations, Boats, Recreation, Bodies of water, Reservoirs, Aquatic environment, Regulation, Local governments, Wildlife development, Local governments, V Aquatic habitats, Hazards. Identifiers: Administrative regulations.

Indiana annotated rules and regulations governing the operation of watercraft in the Salamonie Reservoir, the Mississinewa Reservoir, and the great likelihood that intensive use will be made of Huntington Reservoir are presented. Since there is these bodies of public water and the physical characteristics of the water and the uses made of portions thereof will create unusual hazards for life and property, there should be restrictions on the use of watercraft at these reservoirs for the purposes of safety and fish and wildlife management. Accordingly, regulatory markers should be placed by the department of natural resources on the reservoirs for the purpose of regulating watercraft activities thereon, so as to best protect life and property and to protect the fish and wildlife. Moreover, the bodies of water are to be divided into specific speed zones, as determined by the risk or hazard sought to be avoided. (Mockler-Florida) W74-01455

SIERRA CLUB V. MASON (ACTION TO ENJOIN DREDGING OF NEW HAVEN HARBOR).

351 F. Supp. 419-429 (D. Conn. 1972).

Descriptors: *Judicial decisions, *Environmental effects, *Dredging, *Harbors, *Connecticut, Channel improvement, Legal aspects, Injunctive relief, Excavation, Water pollution control, Project planning, Water law. Identifiers: *National Environmental Policy Act, *Injunctive relief.

The action was brought by plaintiff nonprofit environmentalist group against defendant U.S. Corps of Engineers to enjoin the dredging of New Haven, Connecticut, harbor and the depositing of dredging materials into Long Island Sound. Injunctive relief was granted by the court, not-withstanding defendant's allegations that an injunction would result in economic loss to the oil companies which used the harbor, that shoaling in the harbor had created a safety hazard, and that any delay would result in increased costs to the government. The court held that in view of the fact that the proposed dredging of the harbor, and in particular the proposed offshore dumping of pol-luted spoil, involved substantial likelihood of en-vironmental damage, the failure to prepare an environmental impact statement warranted an injunction prohibiting the U.S. Army Corps of En-gineers and other federal officials from proceeding with the proposed dredging and dumping until all alternatives could be fully considered. (Mockler-Florida) W74-01456

A BILL TO ESTABLISH THE CANAVERAL NA-TIONAL SEASHORE IN THE STATE OF FLORIDA.

House Bill 137, 93rd Cong, 1st Sess, 1973. 5 p.

Descriptors: *Florida, *Legislation, *National seashores, *United States, Coasts, Recreation, Wildlife habitat, Water quality standards, Water pollution control, Governments, Comprehensive planning, Beaches.

This bill seeks to provide for public outdoor recreation use and enjoyment of certain significant shoreline lands and waters of the United States, and to preserve related scenic, scientific, and historic locations at Cape Canaveral, Florida. Within the boundaries of the seashore, the Secretary of the Interior may acquire lands, waters, and land interests by donation, purchase with donated or appropriated funds, exchange or transfer from er federal agency. Property owned by the State of Florida or any political subdivision may be acquired only by the consent of the state or political subdivision. Moreover, the Secretary shall permit hunting, fishing, and trapping on lands and waters under his jurisdiction within the boundaries of the seashore in accordance with the appropriate laws of Florida and the United States to the extent applicable, except that he may designate zones where no hunting, fishing or trapping shall be permitted for reasons of public safety, administration, fish or wildlife management, or public use and enjoyment. The bill also authorizes appropriation of adequate money for the project. (Mockler-Florida) W74-01457

A BILL TO ESTABLISH IN THE STATE OF CALIFORNIA THE SANTA MONICA MOUNTAIN AND SEASHORE NATIONAL URBAN PARK.

Senate Bill 1270, 93rd Cong, 1st Sess, 1973. 13 p.

Descriptors: *Legislation, *National parks, *United States, *Recreation, Scenery, Conservation, Wildlife habitat, Shore protection, Natural resources, Reasonable use, Land use, Land Natural resources, Forests, Parks.

Special priority shall be given by the Secretary of the Interior (Secretary) to acquisition of lands which are of particular scenic, recreational, and open space value. These and other lands shall be administered by the Secretary through the National Park Service in cooperation with the California State Department of Parks and Recreation. The Secretary is empowered to: explore the possibility of obtaining grants and funds from appropriate government agencies to further land acquisition for the park; construct the necessary facilities to protect the values for which the park was established; and extend the benefits of the recreation and open space resource of the Santa Monica Mountain and seashore to the greater Los Angeles region. The legislation creates a commission to administer this program, the members of which shall serve for three years without compensation. The duties of this commission are listed and include advising the Secretary on proposed land uses and holding hearings on proposals for the acquisition of land. (Mockler-Florida) W74-01458

MURFEE V. PHILLIPS PETROLEUM COM-PANY (ACTION BY PROPERTY OWNERS AGAINST OIL AND GAS LESSEES FOR DIMINUTION OF MARKET VALUE OF LAND DUE TO POLLUTION OF UNDERGROUND FRESH WATER SUPPLY). 492 S.W. 2d 667-680 (Ct. Civ. App. Tex. 1973).

Descriptors: *Groundwater resources, *Texas, *Saline water intrusion, *Brines, *Subsurface drainage, Oil drilling, Geologic formations, Judicial decisions, Negligence, Water pollution, Limestone, Water pollution sources, Groundwater booriers. *Veter resolution* barriers, Water supply. Identifiers: Proximate causation.

Plaintiff, the surface owner, brought suit against the oil lessees of his property, maintaining that the land's value had decreased due to the defendant's negligent disposal of brine water produced in thirty-five oil wells on the land. Plaintiff alleged that the defendants were negligent per se in that by pumping the brine water into open pits they had violated a railroad regulation providing that fresh water was to be protected from salt water produced in oil wells. Defendants maintained that the contamination had occurred due to the plaintiff's failure to case test holes drilled by him so that his contributory negligency barred his recovery. As to damages before the drilling of the test wells, the court found that the 100 foot limestone formation between the surface and the fresh water zones was a better barrier than anything the defendants could have constructed so that the plaintiff had failed his burden of showing the defendants' negligence. As to damages after the drilling of the test well, the court found that the invading salt water had entered through the test wells so that the plaintiff's contributory negligence precluded his recovery. (McKnight-Florida) W74-01459

FLORIDA POLLUTION STATUTE INFRINGES UPON EXCLUSIVE FEDERAL MARITIME LEGISLATIVE DOMAIN, THE AMERICAN WATERWAYS OPERATORS, INC. V. ASKEW, 335 F. SUPP. 1241 (M.D. FLA). For primary bibliographic entry see Field 05G. W74-01460

THE PORTER-COLOGNE WATER QUALITY CONTROL ACT, AND RELATED WATER CODE SECTIONS (CONTAINING THE 1971 AMENDMENTS).
California State Water Resources Control Board,

Sacramento. For primary bibliographic entry see Field 05G. W74-01461

Field 06-WATER RESOURCES PLANNING

Group 6E-Water Law and Institutions

CITY OF MONMOUTH V. ENVIRONMENTAL PROTECTION AGENCY (EPA SUED THE CITY TO PROHIBIT THE CITY FROM CONTINUING TO MAINTAIN A SEWAGE LAGOON SYSTEM WHICH WAS EMITTING NOXIOUS ODORS).

295 N. F. 2d 136-140 (3rd D.C.A. III 1973).

Descriptors: *Illinois, *Judicial decisions, *Environmental effects, Legal aspects, Public health, Air quality standards, Constitutional law, Air, Smog, Air pollution, Smoke, Environmental sanitation, Odor.
Identifiers: *National Environmental Policy Act,

*Injunctive relief.

Action was brought by the Environmental Protection Agency against a city for the levey of a fine and an injunction to prohibit the city from continuing to maintain a sewage lagoon system which was emitting noxious odors. The Pollution Control Board fined the city \$2,000 and required the city to cease the emission of odors within six months. On appeal, the court held the Environmental Protection Act does not require the Board to adopt standards establishing hydrogen sulfide levels or regulation the operation of open lagoon facilities and that the act itself establishes sufficient standards to define proscribed conduct and the scope of the authority. Moreover, in the case at bar, the Board's action had not been based on evidence of record, the techological practicability of abatement had not been investigated and the Board's findings were vague, inconsistent and ambiguous. As a result, the appeals court vacated the order and remanded the cause to the lower court for further proceedings. (Mockler-Florida) W74-01462

AND NOT A DROP TO DRINK: WATER RESOURCES PLANNING AND ADMINISTRA-

TION, Harvard Univ., Cambridge, Mass.

M. M. Hufschmidt.

Public Administration Review, Vol 21, No 2, p 81-89, Spring, 1961.

Descriptors: *Water resources, *Administration, Administrative agencies, "Administration, "Administrative agencies, "Governmental inter-relations, "River basins, Arkansas, New York, Delaware, Coordination, Consolidation. Identifiers: Decentralization, Arkansas-White-

Red Basins, Delaware River, Inter-Agency Basin.

Dispersion of organization and administration responsibility among numerous federal and state agencies appears to characterize the water resource activities of government. Political strength in Congress of established agencies and strong preference for the status quo by affected interest groups contribute to this situation. Proponents of change have not clearly conceptualized their objectives, or explained them in terms that would command support beyond the argument that the comprehensive, multiple-purper nature of the problem requires coordinated administration of water resource activities. Suggested approaches for reform are coordination of planning activities of existing agencies at the river basin level, combining of research, planning, development, and operation into unified manage ment of a river basin by a single agency endowed with broad powers, and unifying planning and development procedures and policies on a national basis. Studies of the Arkansas-White-Red Basins Inter-agency Committee, the Delaware River Basin, and of the water resources of New York State are examined. Foremost among conclusions of this review of that two organizational approaches remain to be tried: (1) a consolidation of federal water-resource functions at the top, and their administrative decentralization to major regions or river basins, and (2) the establishment of regional water resource agencies, either Federal, or by interstate compacts in which the Federal Government plays a strong role. (Edwards-North Carolina)

W74-01465

TRI-AGENCIES PIPELINE: ENGINEERING RE-

San Diego County Water Authority, Calif. For primary bibliographic entry see Field 08A. W74-01477

ALLUVION, ISLANDS, AND SAND BARS, K. Massari.

Tulane Law Review, Vol 47, p 367-380, 1973. 63

Descriptors: *Louisiana, *Legislation, *Alluvium, *Islands, *Sand bars, Judicial decisions, Coasts, Sands, Water pollution sources, Riparian rights, Legal aspects, Natural flow doctrine, Alteration of

A comprehensive analysis is presented of alluvion, islands, and sand bars as defined and applied by the legislative scheme in Louisiana. Because the movement of a river or stream may either create, alter or destroy riparian property, the rich alluvial deposits that are formed by these bodies of water have created numerous title disputes in Louisiana and have given rise to an extensive body of creative jurisprudence. The legislative scheme incorporated in the Louisiana Civil Code articles 509 through 518 treats the five basic situations in which river forces change the ownership of riparian property. The laws of alluvion and dereli are not applicable to lakes in Louisiana. (Mockler-W74-01612

EARLY THOUGHTS ON PROSECUTING POL-LUTERS,

Santa Clara, Univ., Calif. For primary bibliographic entry see Field 05G. W74-01613

A BILL TO BE KNOWN AS THE 'RIVER BASIN WASTE TREATMENT AUTHORITY ACT OF 1973

Senate Bill 1877, 93rd Cong, 1st Sess, 1973. 12 p.

Descriptors: *River basin commissions, *Waste treatment, *Waste water (Pollution), *Legislation, *United States, Water resources development, Governmental interrelations, Water quality, Water pollution control, Federal government. Identifiers: River Basin Waste Treatment Authority Act of 1973.

The continued deterioration of the nation's water supply threatens the integrity of the national environment. Improvement in the cleanliness of the nation's waters is essential to the survival of the citizens and of the system, yet after two decades of experience with water pollution control efforts, the purity of water is no more assured today than it was when federal efforts first began. Thus, the federal government must act by creating river basin waste treatment authorities that will assume control over, plan, build, operate, and maintain waste treatment facilities sufficient to control and abate water pollution in entire river basin drainage systems. The Administrator of the Environmental Protection Agency, after consultation with the Secretary of the Army and the Secretary of the Interior shall designate river basin regions which together will encompass the entire United States. The area of each such region shall be determined on the basis of physical, hydrologic or other relationships which will enable the provision of the most systematic and economical waste treatment for the area. Each authority shall, within its re-gion, operate all public waste treatment facilities. (McKnight-Florida) W74-01614

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972. For primary bibliographic entry see Field 05G.

A BILL TO AID THE CONSERVATION OF NATURAL WATER RESOURCES.

House Bill 823, 93rd Cong, 1st Sess, 1973, 1 p.

Descriptors: *Legislation, *Federal government, *North Carolina, *Virginia, Federal Power Act, Political restraints, Rivers, Conservation, Water resources, Scenery, Reservoir construction, Dams, Headwaters.
Identifiers: *New River (N.C.).

This bill is meant to aid the conservation of natural water resources and protect the scenic New River. To this end, notwithstanding any other provision of law, no federal agency or entity shall license or otherwise give permission either under the Federal Power Act or any other act of Congress, for the construction of any dam or reservoir on or directly affecting the New River from the tidewaters of its south and north forks to the town of Fries, Virginia. (Napolitano-Florida) W74-01616

A BILL TO PROVIDE FOR THE ESTABLISH-MENT OF THE GUANA RIVER NATIONAL PARK IN THE STATE OF FLORIDA

House Bill 383, 93rd Cong, 1st Sess, 1973. 2 p.

Descriptors: *Legislation, *National parks, *Water conservation, *Florida, Parks, Wildlife conservation, Preservation, Scenery, Beach erosion, Beaches, Lakes, Ponds, Planning, Land, Conservation.

The bill provides for the establishment of the Guana River National Park in St. Johns County, Florida, on lands designated for that purpose by the Secretary of the Interior. The means by which these lands may be acquired are specified and include donation, purchase and exchange. Such funds are appropriated, as may be necessary to carry out the purposes of the proposed act. (Reed-Florida) W74-01617

A BILL AUTHORIZING THE STATE OF IL-LINOIS AND THE METROPOLITAN SANITA-RY DISTRICT OF GREATER CHICAGO TO IN-CREASE THE DIVERSION OF WATER FROM LAKE MICHIGAN INTO THE ILLINOIS WATERWAY.

House Bill 5542, 93rd Cong, 1st Sess, 1973. 3 p.

Descriptors: *Illinois, *Legislation, *Water quality, Lake Michigan, *United States, Water quality control, Channels, Erosion control, Conservation, Erosion, Water control, Shore protection, Shores, Legal aspects, Regulation, Administration, Water Identifiers: *Water diversion.

The proposed bill authorizes Illinois and the Metropolitan Sanitary District of Greater Chicago, under the direction of the Secretary of the Army, to increase the diversion of water from Lake Michigan into the Illinois Waterway in order to control and eliminate water erosion on the shoreline of Lake Michigan and to improve the quality of the water in the Illinois Waterway. The Secretary may not allow any water in excess of a specified annual average discharge rate to be diverted from Lake Michigan at Chicago except as may be consistent with orders of approval issued the International Joint Commission pursuant to the Boundary Water Treaty of 1909 or with any exchange of notes between the United States and Canada. No diversion is to be allowed when the

level of Lake Michigan is less than a specified average monthly level or when such diversion would interfere with the operation of the flood control system for the Illinois River and its tributaries. (Reed-Florida) W74-01618

DESIGNATING A SEGMENT OF THE ST. CROIX AS FART OF WILD AND SCENIC

1972 Hearing--Subcomm. on Public Lands--Comm. on Interior and Insular Affairs, United States Senate, 92nd Cong, 1st and 2d Sess, Oc-tober 23, 1971, April 14, 1972. 180 p, 1 plate.

Descriptors: *Legislation, *Wild River Act, *Rivers systems, Recreation, Legal aspects, Scenery, Water policy, Water quality control, Running waters, Federal government, Governmental interrelations, *Minnesota, *Wisconsin. Identifiers: *St. Croix River (Minn and Wis).

A bill is presented to amend the Wild and Scenic Rivers Act by designating a segment of the St. Croix River in Minnesota and Wisconsin as a component of the national wild and scenic rivers system. A study of the lower St. Croix by the Deartment of Interior concludes that the lower St. Croix merits inclusion in the national rivers system. The legislation should, ideally, be passed soon in order to preclude destruction of the scenic beauty of the lower St. Croix by intrusions of construction within the line of slight from the river. Statements from representatives of various state and federal agencies indicate that the lower St. Croix and its immediate environment possess outstandingly remarkable scenic and aesthetic, recreational, and geologic values, and that the river should be protected for the benefit and enjoyment of present and future generations. It has been recommended that a master plan for the protection and management of the riverway should be developed and used by all management entities.
(Mockler-Florida) W74-01619

THE MANAGEMENT OF BAY AND ESTUARINE SYSTEMS IN THE TEXAS COASTAL ZONE, PHASE II. Texas Univ., Austin. Div. of Natural Resources and the Environment.
For primary bibliographic entry see Field 05G. W74-01620

6F. Nonstructural Alternatives

CONSOLIDATION OF IRRIGATION SYSTEMS: PHASE 1, ENGINEERING, LEGAL, AND SOCIOLOGICAL CONSTRAINTS AND/OR FACILITATORS, Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering. For primary bibliographic entry see Field 03F. W74-01367

A LINEAR PROGRAMMING APPROACH TO FLOODPLAIN LAND USE PLANNING IN URBAN AREAS,
Arizona Univ., Tucson. Dept. of Agricultural For primary bibliographic entry see Field 03D. W74-01490

HYDROGRAPH SIMULATION MODELS OF THE HILLSBOROUGH AND ALAFIA RIVERS, FLORIDA: A PRELIMINARY REPORT, Geological Survey. For primary bibliographic entry see Field 04A. W74-01611

6G. Ecologic Impact of Water Development

PROMOTING ENVIRONMENTAL QUALITY THROUGH URBAN PLANNING AND CON-TROLS, North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 05D.
W74-01470

TALLAHALA CREEK LAKE, PASCAGOULA RIVER BASIN. MISSISSIPPI (FINAL ENVIRON-MENTAL IMPACT STATEMENT). Army Engineer District. Mobile, Ala. For primary bibliographic entry see Field 04A. W74-01610

TALLULAH CREEK WATERSHED (LONG CREED PORTION) GRAHAM COUNTY, NORTH CAROLINA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 04D. W74-01621

07. RESOURCES DATA

7B. Data Acquisition

COMPARISON OF GAGE AND RADAR METHODS OF CONVECTIVE PRECIPITATION MEASUREMENT, National Oceanic and Atmospheric Administra-

tion, Coral Gables, Fla. Experimental Meteorolo-

gy Lab. For primary bibliographic entry see Field 02B. W74-01149

NEAR REAL TIME WATER RESOURCES DATA FOR RIVER BASIN MANAGEMENT, Geological Survey, Harrisburg, Pa. For primary bibliographic entry see Field 04A. W74-01150

UTILIZATION OF REMOTE SENSING IN RIVER BASIN STUDIES, Army Engineer Waterways Experiment Station, Vicksburg, Miss.

For primary bibliographic entry see Field 05A. W74-01154

ARCTIC DATA BUOYS AND AIDJEX, Washington Univ., Seattle.

In: Arctic Data Buoys; AIDJEX (Arctic Ice Dynamics Joint Experiment) Bulletin No 22, p 1-7, August 1973. 3 fig, 5 ref.

Descriptors: *Data collections, *Arctic Ocean, *Buoys, Water temperature, Currents (Water), Ocean currents, Ocean circulation, Meteorological Hydrologic data. Telemetry

Drifting stations have been used since 1893 to collect data in the Arctic Ocean. Conditions in the Arctic present special challenges to the operation of both manned and unmanned drifting stations Modern technology has made possible unmanned data buoys which can greatly improve data coveage. AIDJEX is participating in the development and use of sea-ice data buoys which will also be required by future polar scientific programs. The Soviets were the first to develop a data buoy specifically for arctic conditions. Called the DARMS (Drifting Automatic Rdio-Meteorological Station), these buoys monitor ice and weather conditions along the Northern Sea Route. Several

hundred of them have been deployed since 1956. New arctic data buoys incorporate recent technological advances. Solid-state electrical components and the utilization of satellites for positioning and data relay have already been de strated. (Knapp-USGS) W74-01156

THE ARCTIC DATA BUOY, A SYSTEM FOR ENVIRONMENTAL MONITORING IN THE

Washington Univ., Seattle. Applied Physics Lab.

D.P. Haugen, and E. G. Kerut.
In: Arctic Data Buoys; AIDJEX (Arctic Ice
Dynamics Joint Experimnt) Bulletin No 22, p 3753, August 1973. 5 fig., 3 tab, 12 ref. NASA NAS-8-

Descriptors: *Data collections, *Arctic Ocean, *Buoys, Water temperature, Currents (Water), Ocean currents, Ocean circulation, Meteorological Hydrologic data, Instrumentation, Telemetry.

An automated data buoy system was developed for environmental monitoring in ice-covered oceans. The buoy operates for a minimum of one year, providing position and environmental data through polar-orbiting satellite telecommunications. It can be deployed by a two- or three-man crew using a small aircraft. It is capable of operating in both free-floating and frozen-in situations. An experimental unit successfully completed a 5month test at Fletcher's Ice Island (T-3) during the winter of 1971-72, and six units were deployed in the Arctic during the spring of 1972. Four of these units have been in operation for more than I yes Results to date demonstrate the utility of the basic design, the effectiveness of the satellite communications, and the feasibility of deploying and operating a large array of such buoy systems in the Arctic Ocean. (Knapp-USGS) 74-01158

BAROMETRIC PRESSURE MEASUREMENTS FROM BUOYS DURING AIDJEX 1972,

Washington Univ., Seattle.

In: Arctic Data Buoys; AIDJEX (Arctic Ice Dynamics Joint Experiment) Bulletin No 22 p 89-111, August 1973. 11 fig, 2 tab, 2 ref. NSF Contract

Descriptors: *Data collections, *Arctic Ocean, *Buoys, *Atmospheric pressure, Water tempera-ture, Currents (Water), Ocean currents, Ocean circulation, Meteorological data, Hydrologic data, Instrumentation, Telemetry.

Two types of buoys were deployed in an array around the main camp during AIDJEX 1972 to ob-tain barometric pressure measurements. Com-parison of portable standards and the mercury barometer revealed significant errors in the mercury barometer readings caused by temperature flu-cutations, and a calibration drift in one of the portable standards: The calibrations are probably accurate to a few tenths of a millibar. Relative precision is about 0.1 mb, which is better than the relative precision of the standards. An observation of an unusual pressure feature was confirmed by duplicate buoys at one site. (Knapp-USGS) W74-01159

A RESONANT CAPSULE PRESSURE TRANS-DUCER FOR DATA BUOYS, Kollsman Instrument Corp., Syosset, N.Y.

E. H. Kahn.

In: Arctic Data Buoys; AIDJEX (Arctic Ice Dynamics Joint Experiment) Bulletin No 22 p 113-137, August 1973. 11 fig., 2 tab.

Descriptors: *Data collections, *Arctic Ocean, *Buoys, *Atmospheric pressure, Water tempera-

Field 07—RESOURCES DATA

Group 7B-Data Acquisition

ture, Currents (Water), Ocean currents, Ocean circulation, Meteorological data, Hydrologic data, Instrumentation, Telemetry.

Recent advances in avionics pressure instrumentation resulted in the ability to measure atmospheric pressure with a high degree of accuracy. The fundamental technique is based on the resonant frequency of an aneroid capsule whose frequency varies with pressure. A new RCPT magnetic drive system features low-power operation and low-production cost. The state of the art is summarized and a low-power demonstration transducer being built for evaluation by the NOAA Data Buoy Office for use by AIDJEX and other members of the oceanographic community is described. (Knapp-USGS)

SYMPOSIUM ON SIGNIFICANT RESULTS OB-TAINED FROM EARTH RESOURCES TECHNOLOGY SATELLITE-1, MARCH 5-9, 1973: VOLUME III--DISCIPLINE SUMMARY REPORTS.

For primary bibliographic entry see Field 07C. W74-01163

LAND USE AND MAPPING,

National Aeronautics and Space Administration, Bay Saint Louis, Miss. Earth Resources Lab. For primary bibliographic entry see Field 04A. W74-01165

MINERAL RESOURCES, GEOLOGICAL STRUCTURE AND LANDFORM SURVEYS, National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. For primary bibliographic entry see Field 07C. W74-01166

ENVIRONMENT SURVEYS,

National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. For primary bibliographic entry see Field 05A. W74-01167

WATER RESOURCES,

National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. For primary bibliographic entry see Field 07C. W74-01168

MARINE RESOURCES AND OCEAN SURVEYS, National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. J. R. Greaves.

In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt Md., March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 70-82, May 1973. 2 append.

Descriptors: *Remote sensing, *Satellites (Artificial), *Oceanography, Data collections, Sea ice, Turbidity, Sounding, Surveys, Tracers, Ocean circulation.

Identifiers: *ERTS.

A synopsis is given of the significant results achieved within the Marine Resources and Ocean Surveys discipline of the overall ERTS program. Suspended sediment proved to be the most clearly visible feature in the nearshore water, allowing limited correlation between the actual sediment load and photographic film density. Sediment acts as a tracer, allowing nearshore circulation (current) patterns, direction of net water transport, and boundaries between different water masses to be discerned. In clear water, the use of contrast enhancement as well as optical and digital density

slicing can be used to infer relative depths in 2-, 5-, and 10-meter steps from the surface down to about 20 meters. An analytic technique calculates absolute depth values based upon the ratios of adjacent MSS channels where some knowledge of bottom reflectivity is available. Sea ice is detectable in all of the ERTS MSS spectral bands and can be distinguished from clouds through a number of interpretive keys. MSS Bands 4 and 7 can be combined to infer the presence of meltwater on the ice and to map snowlines on glaciers. ERTS provides the data for the development of satellite techniques to measure water color, infer circulation and upwelling, and possibly infer temperature and salinity regions by correlation with other surface-acquired data. The measurement of water color may further be related to chlorophyll and turbidity. (See also W74-01163) (Knapp-USGS) W74-01169

INTERPRETATION TECHNIQUES DEVELOP-MENT.

MENT, National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. W. L. Alford.

In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md, March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 83-94, May 1973. 2 append.

Descriptors: *Remote sensing, *Satellites (Artificial), *Data processing, Data collections, Photogrametry.
Identifiers: *ERTS.

Both optical and digital methods of spatial information extraction can provide valuable sources of data information from the ERTS system. Current emphasis is being placed on machine-aided photoanalysis, image correction and enhancement, and automated data processing. The techniques available, even for a limited number of bands (4) and limited resolution (80-meters IFOV) can be effectively used to extract much of the information required by resource managers. (See also W74-01163) (Knapp-USGS) W74-01170

MULTIDISCIPLINARY/REGIONAL RESOURCE SURVEYS,

National Aeronautics and Space Administration, Wallops Island, Va. Wallops Station. G. H. Trafford.

In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md, March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 95-101, May 1973. 2 append.

Descriptors: *Remote sensing, *Satellites (Artificial), Surveys, Resources, *Land use, Geologic mapping, Water pollution, Data collections, Data processing.

Identifiers: *ERTS.

The usefulness of ERTS MSS black-and-white and false-color imagery in the 0.5- to 0.8-micron region is clearly demonstrated for land-use classification at regional, county, and city levels. ERTS MSS imagery yields enhanced geologic interpretation. Spatial filtering, as an image enhancement technique for lineament directional filtering, appears particularly promising for additional refinement at the user technology level. Black-and-white and false-color imagery in the 0.5- to 1.1-micron region in useful for resource surveys. MSS Band 5 (0.6 to 0.7 micron) coupled with the synoptic view afforded by ERTS shows sediment stream loading, lake sedimentation, and offshore efflux, and is also effective in monitoring smoke plumes on a repetitive basis. (See also W74-01163) (Knapp-USGS)

TIDEWATER SHORELINES IN BROWARD AND PALM BEACH COUNTIES, FLORIDA: AN ANALYSIS OF CHARACTERISTICS AND CHANGES INTERPRETED FROM COLOR, COLOR INFRARED AND THERMAL AERIAL IMAGERY,

Florida Atlantic Univ., Boca Raton. Remote Sensing and Interpretation Lab. For primary bibliographic entry see Field 02L.

W74-01220

FOOD CONSUMPTION OF THE FREE-LIVING AQUATIC NEMATODE PELODERA CHIT-WOODI

Auburn Univ., Montgomery, Ala. Dept. of Biology.

For primary bibliographic entry see Field 05A. W74-01225

A SIMPLE PORTABLE FIELD NEPHELOMETER, W. H. Moore.

W. H. Moore. Freshwater Biol. Vol 2, No. 3, p 279-283. 1972, Il-

lus. Identifiers: Lakes, *Nephelometers, Portable instruments, *Suspended solids.

A portable field nephelometer is described, capable of indicating in situ differing layers of suspended material in a body of water to a depth of 30 m. Results were compared with those from a standard transparency meter, and a laboratory nephelometer.—Copyright 1973, Biological Abstracts, Inc. W74-01247

TECHNIQUES FOR MEASURING LIGHT AB-SORPTION SCATTERING, AND PARTICLE CONCENTRATIONS IN WATER,

Environmental Research Inst. of Michigan, Ann Arbor.

O. E. Prewett, D. R. Lyzenga, and F. C. Polcyn. Available from NTIS, Springfield, Va., 22151, AD-759 668, Price \$3.00 printed copy; \$1.45 microfiche. Final Report prepared for NOAA, National Environmental Satellite Service, Washington, D.C., April 1973. 17 p, 6 fig, 4 tab, 5 ref. NAVOCEANO N62306-71-C-0108.

Descriptors: *Remote sensing, *Suspended solids, *Surface waters, *Light intensity, *Aquatic environment, Light penetration, Aerial photography, Analytical techniques, Lakes, Turbidity, Sediment transport.

Identifiers: *Multispectral scanner imagery, Scattering models, Water particle concentrations.

The usefulness of multispectral remoate sensing techniques was investigated in determining the concentration of suspended solids in aquatic en-vironments. Aerial photography and multispectral scanner imagery are used to record the upwelling radiation at various locations on the surface of the water. Procedures for determining the concentration of suspended solids are explored. Two techniques are discussed: the first applies to bodies of water that are shallow and fairly clear; the second applies to bodies of water that are deep or very turbid. The first technique is a direct out-growth of earlier water-depth studies and, when the necessary ground-truth data are available, can also be used to determine water depth or the scattering and adsorption coefficients of the lake. The second has the advantage of requiring less groundtruth data for interpretation of the remote mea-surements. Both techniques are feasible within certain operational constraints. Both give values of the concentration of suspended solids, relative to the concentration at a fixed point, for every location in a body of water for which multispectral data are available. The absolute values of the con-centration at all points can be determined, however, if the absolute concentration is known at a single point. (Woodard-USGS)
W74-01283 WAVE-INDUCED WATER PARTICLE MOTION

MEASUREMENTS, Naval Postgraduate School, Monterey, Calif. For primary bibliographic entry see Field 02E. W74-01285

APPLICATION OF INFRARED FOURIER TRANSFORM SPECTROSCOPY TO ANALYSIS OF MICRO SAMPLES, Dow Chemical Co., Midland, Mich. Analytical

For primary bibliographic entry see Field 02K. W74-01303

A COMPARISON OF FAST DESTRUCTION METHODS FOR THE DETERMINATION OF TRACE METALS IN BIOLOGICAL MATERI-

Brussels Univ. (England). Pharmaceutical Inst. For primary bibliographic entry see Field 05A.

IMPROVED DISTILLATION METHOD FOR VOLATILE ACIDS ANALYSIS, Somerset Raritan Valley Sewerage, Somerville,

For primary bibliographic entry see Field 05A. W74-01322

NOVEL METHOD OF RAMAN DATA ACQUISI-Campinas Univ. (Brazil). Gleb Wataghin Inst. of

Physics. For primary bibliographic entry see Field 02K. W74-01330

AUTOMATED RAPID SCAN INSTRUMENT FOR SPECTROELECTROCHEMISTRY IN THE

VISIBLE REGION, Naval Research Lab., Washington, D.C. Elec-

trochemistry Branch. For primary bibliographic entry see Field 02K. W74-01331

SEMIINTEGRAL ELECTROANALYSIS: SHAPES OF NEOPOLAROGRAMS,
Trent Univ., Peterborough (Ontario). Dept. of

For primary bibliographic entry see Field 05A. W74-01333 Chemistry.

VERSATILE COMPUTER GENERATED VARI-ABLE ACCELERATING VOLTAGE CIRCUIT FOR MAGNETICALLY SCANNED MASS SPEC-TROMETERS. USE FOR ASSAYS IN THE PICO-GRAM RANGE AND FOR ASSAYS OF STABLE

ISOTOPE TRACERS, Washington Univ., St. Louis, Mo. Biomedical Computer Lab.

For primary bibliographic entry see Field 02K. W74-01335

SIMPLE INEXPENSIVE FREEZE-DRYING PROCEDURE.

Bureau of Alcohol, Tobacco and Firearms, Cincinnati, Ohio.

J. W. Young, and G. D. Christian. Analytical Chemistry, Vol 45, No 7, p 1296, June

Descriptors: *Analytical techniques, *Methodolo-

Identifiers: *Freeze drying, *Serum, Sample preparation, Blood.

Serum can be rapidly and inexpensively lyophilized for analysis by immersing and gently swirling a beaker containing the serum in a bath of dry ice and acetone. After the serum is frozen on the beaker in a thin film, a vacuum desiccator is attached and a vacuum applied until the sample is dried. No loss occurs with this procedure, and a 1ml sample can be dried in about 30 min. (Little-Battelle) W74-01339

NEW DETECTOR FOR ION-EXCHANGE CHROMATOGRAPHY,

Cincinnati Univ., Ohio. Dept. of Chemistry For primary bibliographic entry see Field 05A. W74-01343

MOLECULE-SIZE DISTRIBUTION OF SOLU-BLE HUMIC COMPOUNDS FROM DIFFERENT NATURAL WATERS,

For primary bibliographic entry see Field 02H. W74-01351

COMPARISON OF THE SNOW RESISTO-GRAPH WITH THE RAM PENETROMETER, Montana State Univ., Bozeman. Dept. of Earth Sciences.

For primary bibliographic entry see Field 02C. W74-01381

GEOPHYSICAL MEASUREMENTS OF THE THICKNESS OF THE MALYY AZAU GLACIER (GEOFIZICHESKIYE **OPREDELENIYA** MOSHCHNOSTI LEDNIKA MALYY AZAU), Moscow State Univ. (USSR). Problemnaya Laboratoriya Kompleksnogo Kartografirovaniya i

For primary bibliographic entry see Field 02C. W74-01390

USE OF ISOTOPIC METHODS TO DETER-MINE PRESENT RATES OF SNOW ACCUMU-LATION IN ANTARCTICA (ISPOL'ZOVANIYE IZOTOPNYKH METODOV DLYA OPREDELENIYA SOVREMENNOY SKORSTI NAKOPLENIYA SNEGA V ANTARKTIDE), Akademiya Nauk SSSR, Moscow. Institut Geok-himii i Analiticheskoi Khimii. For primary bibliographic entry see Field 02C. W74-01393

OXYGEN ELECTRODE MICRORESPIROMETER, Newcastle-upon-Type Univ. (England). Dept. of For primary bibliographic entry see Field 05A.

SMALL-VOLUME SOLID-ELECTRODE FLOW--THROUGH ELECTROCHEMICAL CELLS.
PRELIMINARY EVALUATION USING PULSE POLAROGRAPHIC TECHNIQUES, Hoffmann-La Roche, Inc., Nutley, N.J. Animal

Health Research.

W74-01419

A. MacDonald, and P. D. Duke. Journal of Chromatography, Vol 83, p 331-342, August 29, 1973. 9 fig, 33 ref.

Descriptors: *Instrumentation, *Equipment, Electrochemistry, Automatic control, Flow rates, Measurement, Polarographic analysis, Evaluation, Stability, Methodology.
Identifiers: *Performance evaluation, *Elec-

trochemical cells, *Pulse polarography, *Solid electrodes, Detectors, Liquid chromatography, Sensitivity, p-Aminophenol.

A preliminary evaluation is given of the use of potentiostatic pulse polarographic techniques for solid-electrode flow-through electrochemical cells as detectors for use in both automated analysis and liquid chromatography. The following advantages are noted over previously reported constant-applied-potential techniques: increased sensitivity, minimal effect of flow-rate on current

easurement and a vast increase in electrode sta bility for the short-term sampling period and for extended routine operation. (Holoman-Battelle) W74-01445

ESTIMATION OF DOMAIN MEANS USING TWO-PHASE SAMPLING, Central Bureau of Statistics, Accra (Ghana).

K. T. deGraft-Johnson, and J. Sedransk. Biometrika, Vol 60, No 2, p 387-393, August 1973.

Descriptors: *Estimating, Statistical methods, Sampling.
Identifiers: *Two-phase sampling, *Domain means, Sample size.

To estimate means of subpopulations or 'domains of study' where there is no list of units comprising each domain, a two-phase sampling procedure may be employed. One possibility is to select a simple random sample of size n prime with the domain to which each unit belongs being determined. Then a simple random subsample of size n sub j is selected from the n prime sub j units found in the first phase sample to be members of the jth domain. Given the values of the n prime sub j it is desired to allocate a fixed total second phase sample size, n, to the domains in an optimal manner. Then one may determine the optimal choices for n prime and n. Alternatively, one may use a stratified random sample of size n prime with n prime sub h units being selected from the hth stratum. Given that the first phase sample yields n prime sub hj units in the hth stratum, ith domain, the number of units, n sub hj to be subsampled by simple random sampling is to be determined to maximize a measure of precision. (Little-Battelle) W74-01498

ROTAMETER.

Measurements and Data, Vol 7, No 4, p 122-127, July/August 1973. 4 fig, 2 tab.

Descriptors: *Design criteria, *Flowmeters, Equations, Mathematical studies, Flow rates, Mechanical equipment.
Identifiers: *Rotameters.

Rotameters are of four general types: purge me-ters, glass-tube general-purpose meters, armored meters, and special-purpose meters. The meters can be adapted for use at low or high fluid pressures, and to monitor flow of caustic or corrosive as well as bland fluids. Although the units are as were as of and fluids. Annough the units are frequently inexpensive they are accurate and reliable. A list of commercially available units with descriptive information and prices is given along with the derivation of the basic rotameter flow equation. (Little-Battelle)
W74-01500

ULTRASONIC THERMOMETRY. ly/August 1973. 6 fig.

Descriptors: *Water temperature, Electronic equipment, Gases.
Identifiers: *Ultrasonic thermometry.

Ultrasonic thermometry is discussed with regard to measurement principles, instrumentation techniques, resonant and esonant sensors, impulse-induced-resonance, thermomechanical techniques, and future potential. Representative equipment is illustrated. (Little-Battelle) W74-01501

ION SELECTIVE SENSORS, State Univ. of New York, Buffalo. Dept. of Chemistry.

Field 07—RESOURCES DATA

Group 7B—Data Acquisition

For primary bibliographic entry see Field 05A. W74-01506

DOUBLE PULSE COULOSTATICS, Northern Illinois Univ., DeKalb. Dept. of Chemistry. For primary bibliographic entry see Field 02K. W74-01511

GLASS-METAL COMPOSITE ELECTRODES, Louisiana State Univ., New Orleans. Dept. of Chemistry. For primary bibliographic entry see Field 02K.

ION-ELECTRODE BASED AUTOMATIC GLU-COSE ANALYSIS SYSTEM, State Univ. of New York, Buffalo. Dept. of Chemistry. For primary bibliographic entry see Field 05A. W74-01513

GUIDE TO SELECTING GRAPHIC DISPLAYS, A. Krigman. Instruments and Control Systems, Vol 46, No 9, p 87-91, September 1973. 1 tab.

Descriptors: *Design criteria, Monitoring, Electronic equipment.
Identifiers: *Data displays.

Guidelines are presented to assist in the design of graphic displays which will provide information to operators in an optimum fashion. Among the topics discussed are display formats, lighting, configuration, engineering, and physical parameters. Manufacturers and brief system descriptions are listed. (Little-Battelle)

SOME EFFECTS OF FILTRATION ON THE DETERMINATION OF NUTRIENTS IN FRESH AND SALT WATER, National Marine Fisheries Service, Galveston,

National Marine Pisheries Service, Galveston, Tex. Biological Lab. K. T. Marvin, R. R. Proctor, Jr., and R. A. Neal. Limnol Oceanogr. Vol 17, No 5, p 777-784. 1972. Identifiers: "Filtration, "Nutrients, Water samples, Filters, Fresh water, Salt water.

The nutrient concentration of samples of water often changes significantly during filtration. Six types of filters and 4 nutrients in fresh- and also salt-water solution were tested. Two major sources of variation were elution of nutrients from the filters by the water samples and, conversely, adsorption of nutrients from the sample by the filter.--Copyright 1973, Biological Abstracts, Inc. W74-01521

PANKHURST TUBES MODIFIED TO IN-DICATE ANAEROBIOSIS, Nairobi Univ. (Kenya).

For primary bibliographic entry see Field 05A. W74-01545

CHOOSING A STATIC INVERTER SYSTEM, Continental Oil Co., Ponca City, Okla. Maintenance Engineering Dept. N. L. Conger. Instrumentation Technology, Vol 20, No 9, p 57-65, September 1973. 7 fig, 5 tab, 6 ref.

Descriptors: *Design criteria, Maintenance. Identifiers: *Static inverter systems, *Power supplies, Batteries, Inverters, Chargers.

Data are given on the key specifications for hardware available from ten manufacturers of static inverter systems which serve as power backups. The similarities and differences of the systems are highlighted. A checklist is included to assist in specifying, purchasing, and installing a system. (Little-Battelle) W74-01547

A NEW TYPE OF CLIMATIZED GAS EXCHANGE CHAMBER FOR NET PHOTOSYNTHESIS AND TRANSPIRATION MEASUREMENTS IN THE FIELD, Wuerzburgh Univ. (West Germany). Boranisches Institut II.
For primary bibliographic entry see Field 02I.

W74-01568

W74-01574

A RELIABLE AND INEXPENSIVE SOIL FROST GAGE, Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management. For primary bibliographic entry see Field 02G.

SEPARATION AND IDENTIFICATION OF CAR-BOFURAN, ITS METABOLITES, AND CONJU-

GATES FOUND IN FISH EXPOSED TO RING C-14-LABELED CARBOFURAN USING ITLC SIL-ICA GEL STRIPS,
Illinois Univ., Urbana. Agricultural Experiment Station.
For primary bibliographic entry see Field 05A.

For primary bibliographic entry see Field 05A. W74-01577

AN AUTOMATIC SEPARATOR FOR THE REMOVAL OF AQUATIC INSECTS FROM DETRITUS,

National Inst. for Physical Planning and Construction Research, Dublin (Ireland). E. Fahv.

J Appl Ecol., Vol 9, No 2, p 655-658. 1972. Illus. Identifiers: *Aquatic insects, *Automatic separation, *Detritus. Electricity.

In the apparatus describes, insects are stimulated electrically so that they move into a water current which conveys them to collection sieves from which they are recovered.—Copyright 1973, Biological Abstracts, Inc.
W74-01624

7C. Evaluation, Processing and Publication

PREDICTION OF WELL DEVELOPMENT POS-SIBILITIES IN DELAWARE BY MEANS OF CALIBRATED GAMMA-RAY LOGS, Delaware Geological Survey, Newark. For primary bibliographic entry see Field 04B. W74-01108

PRECIPITATION VARIABILITY OVER NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. of

Geosciences.
For primary bibliographic entry see Field 02B.
W74-01111

A STOCHASTIC MODEL OF STREAMFLOW BASED ON THE THEORY OF FUNCTIONS OF MARKOV PROCESSES,

Arizona Univ., Tucson.
For primary bibliographic entry see Field 02E.
W74-01123

A DETERMINISTIC PARAMETRIC WATER-BALANCE MODEL,
Norwegian Water Resources and Electricity

Board, Oslo. For primary bibliographic entry see Field 02A. W74-01126 NUMERICAL SIMULATION OF THE RAIN-FALL-RUNOFF PROCESS ON A DAILY BASIS, Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering. For primary bibliographic entry see Field 02A. W74-01127

DEVELOPMENT OF A CONCEPTUAL DETER-MINISTIC RAINFALL-RUNOFF MODEL, Swedish Meteorological and Hydrological Inst., Stockholm. For primary bibliographic entry see Field 02A. W74.01128

DIVISION OF THE UNITED STATES INTO REGIONS ACCORDING TO COPHASAL FLUCTUATIONS OF ANNUAL RUNOFF (RAYONIROVANIYE TERRITORII SSHA PO SINFAZNOSTI KOLEBANIY GODOVOGO STOKA REK),
For primary bibliographic entry see Field 02E. W74-01140

ENGINEERING CHARACTERISTICS OF OVERBURDEN IN KNOX COUNTY, TENNES-SEE, Geological Survey, Washington, D.C.

Geological Survey, Washington, D.C. L. D. Harris, and J. M. Kellberg. Available from USGS, Washington, D.C. 20402 Price \$0.75. Miscellaneous Geologic Investigations Maps I-767 K, 1972. 1 sheet, I map, I tab.

Descriptors: *Overburden, *Earth materials, *Geologic mapping, *Tennesses, Sediments, Soils, Rocks, Engineering structures, Design criteria, Particle size, Clays, Sands, Silts, Gravels, Gemorphology, Weathering, Erosion, Geological surveys.

Identifiers: *Knox County (Tenn).

This one-sheet geologic atlas describes engineering characteristics of overburden in Knox County, Tenn. Most manmade small- and medium-sized structures in the county are founded on unconsolidated material. Because engineers are primarily concerned with the physical properties of unconsolidated materials that directly affect engineering design and construction, they prefer to use the Unified Soil Classification System (included in this report) which stresses the engineering characteristics of unconsolidated materials. Soil or overburden as defined by engineers includes the soil and weathered rock down to bedrock. Subdivisions of the Unified Soil Classification System are based on the size of particles and their proportions, physical behavior, and the amount of organic material. The map, although generalized, is intended as a guide in the early planning stage of an engineering project. (Woodard-USGS) W74-01143

OVERBURDEN RELATED TO TYPE OF BEDROCK AND ENGINEERING CHARACTERISTICS OF THE BEDROCK, KNOX COUNTY, TENNESSEE,

114, LENNESSEE,
Geological Survey, Washington, D.C.
L. D. Harris, and J. M. Kellberg.
For sale by USGS, Washington, D.C. 20242 Price
Tors per set. Miscellaneous Geologic Investigations Map I-767 J, 2 sheets, 1972. 1 map, 1 tab, 9 ref.

Descriptors: *Overburden, *Earth materials, *Bedrock, *Geologic mapping, *Tennessee, Sediments, Soils, Rocks, Geologic formations, Geological surveys, Engineering, Weathering, Erosion, Geomorphology, Chemical reations. Identifiers: *Knox County (Tenn.).

This 2-sheet map folio describes unconsolidated earth materials and bedrock in Knox County, Tenn. In this report, the term overburden includes all unconsolidated material and weathered rock

Evaluation, Processing and Publication—Group 7C

down to hard bedrock. The thickness of the overburden is a function of the climate, the resistance of minerals in the bedrock to weathering, the abundance of fractures or cracks in the rock attitude of bedding, the volume of insoluble material (residue) remaining after weathering, and the rate of erosion. The depth of weathering is nearly proportional to the amount of carbonate minerals orginally present in the bedrock. Drill records of approximately 300 wells indicate that rocks with few or no carbonate minerals (such as shale with subordinate limestone and siltstone. sandstone, and shale) may weather to depths of as much as 25 feet; rocks which contain as much as 45% carbonate as cement (such as calcareous sandstone with subordinate shale, calcareous siltstone with subordinate limestone and shale) may locally weather to depths in excess of 100 feet. (Woodard-USGS) W74-01144

CATEGORIES OF RELATIVE FEASIBILITY FOR SEPTIC-TANK FILTER FIELDS IN KNOX COUNTY, TENNESSEE, Geological Survey, Washington, D.C.

L. D. Harris.

For sale by USGS, Washington, D.C. 20402 Price \$0.75. Miscellaneous Geologic Investigations Map I-767 L., 1 sheet, 1972. 1 map, 7 ref.

Descriptors: *Geologic mapping, *Septic tanks, *Soil disposal fields, *Tennessee, *Soil filters, Waste disposal, Sewage, Water pollution sources, Water pollution control, Geomorphology, Soil types, Geological surveys.
Identifiers: *Knox County (Tenn.).

This map (scale 1:250,000) classifies land in Knox County, Tennessee, according to its natural physical capabilities to support the installation of septictank fields. Although the map indicates to planners the general suitability of a large area, sufficient data are not shown to predict the absolute suita-bility of a single small building site. Onsite evaluation of individual building sites is recommended. Factors limiting the usefulness of septic-tank filter systems as suggested in U.S. Public Health Service (1969) and Bender (1961) are: percolation rate, groundwater level, soil drainage on shale, depth to bedrock, slope of the ground, proximinty to other bodies of water, and flood hazard. (Woodard-USGS) W74-01145

SOIL ASSOCIATION MAP OF KNOX COUNTY, TENNESSEE.

Geological Survey, Washington, D.C.

For sale by USGS, Washington, D.C. 20242 Price \$0.75. Miscellaneous Geologic Investigations Map I-767 H, I sheet, 1972. 1 map, I tab.

Descriptors: *Soil classification, *Soil types, *Geologic mapping, *Tennessee, *Soil formation, Soil groups, Soil chemical properties, Earth materials, Soil analysis, Weather Geomorphology, Erosion, Geological surveys. Identifiers: *Knox County (Tenn.). Weathering,

This map, scale 1:125,000, and related information describe the soil association in Knox County, Tenn. Parent materials of soils in the county are of two broad classes: (1) material derived from weathering of sedimentary rocks in place (residuum), and (2) materials transported by gravity (colluvium) or by streams (alluvium). Distribu-tion of soils derived from residuum is closely controled by the distribution of different sedimentary rocks. Weathering of these rocks has resulted in the development of residual soils arranged in a northeast-trending pattern nearly paralleling the pattern formed by sedimentary rocks. Slow gravi-ty movement of soils down slopes has modified the original distribution of residual soils by shifing their boundaries toward the valleys. The alluvial

soils are relatively small deposits along streams and show little relation to the trend of sedimentary rocks. (Woodard-USGS) W74-01146

GROUND-WATER YIELD POTENTIAL IN KNOX COUNTY, TENNESSEE, Geological Survey, Washington, D.C.

W. M. McMaster. Available from USGS, Washington, D.C. 20242 Price \$0.75. Miscellaneous Geoligic Investigations Map I-767 E, 1 sheet, 1973. 1 map, 3 ref.

*Groundwater *Hydrogeology, *Aquifer characteristics,
*Mapping, *Tennessee, Water wells, Water yield,
Geology, Drilling, Test wells, Geological surveys, Identifiers: *Knox County (Tenn.).

This one-sheet map folio describes conditions that affect groundwater availability in Knox County, Tennessee. The county is underlain by a variety of consolidated sedimentary rocks, including dolomite, limestone, shale, and sandstone. These rocks are not permeable enough to allow water to move freely through them or porous enough to allow water to be retained within them. There is no direct way to identify the presence of large waterbearing openings other than by drilling, but knowledge of the geology and water-bearing characteristics, probable thickness of saturated weathered material, and topography can be used to delineate areas potentially favorable for largeyield wells. On this basis, and using available well records, this generalized map showing ground-water yield potential for Knox County was prepared. Water-bearing openings are common to depths of 250 feet, less common at depths of 250 to 350 feet, and rare below 350 feet. Although sizable openings have been penetrated by wells at depths of 600 feet or more, few wells obtain significant amounts of water below 350 feet. (Woodard-USGS)

SENSITIVITY OF GROUNDWATER FLOW MODELS TO VERTICAL VARIABILITY OF AQUIFER CONSTANTS, Oklahoma State Univ., Stillwater. Dept. of Civil

Engineering.
For primary bibliographic entry see Field 04B.

THE SOVIET DARMS PROGRAM-TWENTY EARS OF DEVELOPMENT, DEPLOYMENT, AND DATA, National Science Foundation, Washington, D.C.

Office of Polar Programs. S. M. Olenicoff.

In: Arctic Data Buoys; AIDJEX (Arctic Ice Dynamics Joint Experiment) Bulletin No 22, p 8-34, August 1973. 5 fig, 5 tab, 15 ref.

Descriptors: *Data collections, *Arctic Ocean, *Buoys, Water temperature, Currents (Water), Ocean currents, Ocean circulation, Meteorological data, H Hydrologic data, Instrumentation,

Since 1953, the Soviet Arctic and Antarctic Research Institute has been deploying two types of automatic stations on the pack ice of the Arctic Basin: the Alekseyev radio-beacon (for position data only) and the DARMS (Drifting Automatic Radio-Meteorological Station). In recent years, the Soviets have developed and are starting to deploy a more advanced automatic station which will collect hydrological as well as meteorological data. During the past 20 years, approximately 440 automatic stations have been deployed, and they have relayed over 40,000 coordinate determinations and about 150,000 meteorological measurements. These data have been regularly processed.

distributed, and utilized to improve weather and ice forecasts for the Arctic regions, particularly during the navigation period along the Northern Sea Route. (Knapp-USGS) W74-01157

BAROMETRIC PRESSURE MEASUREMENTS FROM BUOYS DURING AIDJEX 1972, Washington Univ., Seattle.

For primary bibliographic entry see Field 07B.

A RESONANT CAPSULE PRESSURE TRANS-DUCER FOR DATA BUOYS, Kollsman Instrument Corp., Syosset, N.Y. For primary bibliographic entry see Field 07B.

SYMPOSIUM ON SIGNIFICANT RESULTS OB-TAINED FROM EARTH RESOURCES TECHNOLOGY SATELLITE-1, MARCH 5-9, 1973: VOLUME III--DISCIPLINE SUMMARY

Available from the National Technical Information Service as N73-28405, \$8.25 in paper copy, \$1.45 in microfiche. National Aeronautics and Space Administration, Goddard Space Flight Center Publication X-650-73-155. S. C. Freden, and E. P. Mercanti, editors, May 1973. 118 p.

Descriptors: *Remote sensing, *Satellites (Artificial), *Data collections, *Data processing, Land use, Surveys, Mapping, Geology, Resources, Water pollution, Air pollution, Oceanography. Identifiers: *ERTS.

The first Earth Resources Technology Satellite (ERTS-1) was launched on July 23, 1972. In the 7 months since it was activated, over 34,000 scenes of the earth have been obtained, covering all major land masses and about 75% of the world's land area. Some areas, such as the United States, have been imaged at least 12 times. The purpose of the ERTS program is to provide an assessment of remote sensing from a satellite as a technique for inventorying and monitoring the earth's resources to provide for better management of these resources. This symposium provided the first open forum where the users of the ERTS data had the opportunity to present the significant accomplish-ments from their investigations. It also provided the first opportunity for representatives of federal, state, and local organizations to present their views on how ERTS data are being used and will be used for solving operational resources management problems. The reports of the Working Groups which were convened to summarize and critique the ERTS results in the various disciplines are presented. (See also W73-14126 and 01164 thru W74-01171) (Knapp-USGS)

FORESTRY. AGRICULTURE.

RESOURCES, National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center. For primary bibliographic entry see Field 03F. W74-01164

LAND USE AND MAPPING. National Aeronautics and Space Administration, Bay Saint Louis, Miss. Earth Resources Lab. For primary bibliographic entry see Field 04A.

W74-01165

RESOURCES, GEOLOGICAL STRUCTURE AND LANDFORM SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. N. M. Short.

Field 07—RESOURCES DATA

Group 7C—Evaluation, Processing and Publication

In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md., March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 30-46, May 1973. 2 append.

Descriptors: *Geologic mapping, *Remote sensing, *Satellites (Artificial), Mapping, Data collections, Surveys, Geomorphology, Mining, Exploration, Structural geology, Faults (Geologic), Folds (Geologic), Joints (Geologic), Fractures (Geologic).

[Geologic].
[Jentifiers: *ERTS.

In regions where rock exposures are good because of low vegetation cover, major geologic features such as folds, fault offsets, intrusion outlines, volcanic flows, contacts between rock units, and many landforms can be effectively mapped from ERTS images with details comparable to mapping by conventional methods. Folds and similar structural features are detectable. Success in detection depends on lithologic types and sequence (contrast effects), width of exposed units, topographic expression, size of structure, structural setting, degree of exposure, extent of ground cover, and sun angle. ERTS is effective in bringing to light previously unrecognized circular structures. The most frequently reported achievement from ERTS of direct concern to geology is its ability to detect linear features on the earth's surface. Some of these features are nongeological, such as powerlines, roads, and animal migration routes. Geological linear features include contacts, metamorphic grain, fractures, joints, faults, and lineaments, which can include any of the foregoing structural elements as well as other tectonic features of an indefinite nature. These linar features vary in scale and length from a few kilometers to regional or subcontinental dimensions. In some instances, mines or quarries that were not associated with known structural controls appear to fall on or close to individual linears or intersection points. (See also W74-01163) (Knapp-USGS) W74-01166

ENVIRONMENT SURVEYS,

National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. For primary bibliographic entry see Field 05A. W74-01167

WATER RESOURCES,

National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. V. V. Salomonson.

In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md., March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 57-69, May 1973. 2 append.

Descriptors: *Remote sensing, *Satellites (Artificial), *Water resources, Land use, Snow cover, Glaciers, Data collections, Lakes, Wetlands, Mapping, Water quality, Water pollution, Soil water.

Identifiers: *ERTS.

Various land uses related to water resources management can easily be identified and mapped using ERTS-1 data at a scale of 1:250,000. The sources of water pollution, sediment load sources, and changing water yield can be delineated. ERTS-1 detection of geologic fracture zones and especially intersections of fractures has potential for the development of groundwater resources. Areas inundated by flooding can be mapped at scales of 1:250,000 or larger. The elevations of the snowline can be estimated to the nearest 60 meters. The multispectral repetitive coverage permits observations of medial moraines, unusual glacier surges or movements, snowlines, and other features. Surg-

ing glaciers can be distinguished from nonsurging glaciers by their folded moraines. The Data Collection System on ERTS-1 is a reliable and rapid means of collecting and relaying hydrologic data so that they can be used in management situations requiring nearly real-time data. Surface-water bodies as small as 1 hectare in size can be located and rivers as narrow as 70 meters can be easily followed. Reflectance variations are readily observable in water bodies from ERTS-1. These reflectance variations are due largely to variations in depth, suspended sediments, concentrations and pollutants, and biological activity. (See also W74-01163) (Knapp-USGS) W74-01168

MARINE RESOURCES AND OCEAN SURVEYS, National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. For primary bibliographic entry see Field 07B. W74.01169

INTERPRETATION TECHNIQUES DEVELOP-

MENT, National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. For primary bibliographic entry see Field 07B. W74.01126

MULTIDISCIPLINARY/REGIONAL RESOURCE SURVEYS,

National Aeronautics and Space Administration, Wallops Island, Va. Wallops Station. For primary bibliographic entry see Field 07B. W74-01171

OBJECTIVE REGIONALIZATION OF PEAK FLOW RATES.

Agricultural Research Service, Chickasha Okla. Soil and Water Conservation Research Div. For primary bibliographic entry see Field 04D. W74-01174

COMPUTER SIMULATION OF ESTUARIAL NETWORKS.

California Univ., Berkeley. Dept. of Civil Engineering. For primary bibliographic entry see Field 02L. W74-01197

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 4 AND 5. ST LAWRENCE RIVER BASIN AND HUDSON BAY AND UPPER MISSISPIP RIVER BASINS. Geological Survey, Washington, D.C.

For primary bibliographic entry see Field 02K. W74-01268

AREAS OF POSSIBLE FLOODING IN KNOX COUNTY, TENNESSEE,

Geological Survey, Washington, D.C. L. D. Harris.

For sale by USGS, Washington, DC 20402 - Price \$0.75. Miscellaneous Geologic Investigations Map I-767 M, 1 sheet, 1973. 1 map, 5 ref.

Descriptors: *Flood plains, *Regional flood, *Mapping, *Tennessee, Geomorphology, Sinks, Karst, Geological surveys, Flood forecasting, Flood protection, Construction, Design criteria, Flood plain zoning. Identifiers: *Knox County (Tenn).

Major flooding of the Tennessee, Holston, and French Broad Rivers in Knox County, Tennessee, has not taken place since the construction in 1941 and 1943 of both upstream and downstream reservoirs that regulate the discharge of these rivers. Although frequency and size of floods is now lessened, studies by the Tennessee Valley Authority (1958; 1965) indicate that even with regulation great floods are possible. Because the potential to flood still exists in Knox County, the Tennessee Valley Authority prepared a series of maps, from which this map (scale: 1:125,000) was compiled, delineating the maximum areas that could reasonably be expected to be flooded as a result of a great regional storm. Areas with abundant sinkholes are also shown on the map because they are natural depressions where the potential to flood is great. (See also W74-01270) (Woodard-USGS) W74-01269

AREAS WITH ABUNDANT SINKHOLES IN KNOX COUNTY, TENNESSEE,

Geological Survey, Washington, D.C. L. D. Harris.

E. D. Halis.
For sale by USGS, Washington, DC 20402 - Price \$0.75. Miscellaneous Geologic Investigations Map I-767 F, 1 sheet, 1973. 4 fig, 1 map, 7 ref.

Descriptors: *Sinks, *Karst, *Geologic mapping, *Tennessee, Geological surveys, Geology, Geomorphology, Topography, Caves, Land subsidence, Groundwater movement, Karst hydrology, Land use, Evaluation. Identifiers: *Knox County (Tenn).

This one-sheet map folio describes the origin of sinkholes and depicts the location of sinkholes in Knox County, Tenn. In these karst areas, the abundance of sinkholes with no external drainage, the probable presence of subsurface cavities with no expression on the surface, and the movement of groundwater controlled by an interconnected system of solution cavities, all combine to form natural conditions that should influence the use of these areas. Common problems characteristically associated with karst areas include differential subsidence, collapse, temporary or permanent flooding in sinkholes, and contamination of groundwater resources. Thus, a knowledge of the potential problems as well as careful planning are required to achieve a balance between land use and the natural drainage systems of the area. (See also W74-011270

LINEAR PROGRAMMING AND CHANNEL FLOW IDENTIFICATION, California Univ., Los Angeles. Dept. of Engineer-

California Univ., Los Angeles. Dept. of Engineer ing Systems. For primary bibliographic entry see Field 08B. W74-01277

HYDRODYNAMIC MODELING OF TWO-DIMENSIONAL WATERSHED FLOW, Illinois Univ., Urbana. Dept. of Civil Engineering. For primary bibliographic entry see Field 02A. W74-01278

PROCESSING AND STORAGE OF HYDROMETEOROLOGICAL DATA IN THE ATMOSPHERIC ENVIRONMENT SERVICE,

Atmospheric Environment Service, Toronto (On-

J. Rogalsky, and H. L. Ferguson.
In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 1-7, 1971. 2 fig. 1 tab, 5 ref.

Descriptors: *Data collections, *Meteorological data, *Canada, *Data processing, *Data storage and retrieval, Hydrologic data, Flood forecasting, Precipitation (Atmospheric), Streamflow forecasting, International Hydrological Decade.

The Atmospheric Environment Service has collected, processed, and preserved Canadian climatic data for more than 100 years. Since 1950 many of the data files have been transcribed to

Evaluation, Processing and Publication—Group 7C

machine-sensible media. This period has seen a very rapid development of electronic data processing equipment and techniques and this evolution is expected to continue. The AES has accordingly developed adaptable and versatile procedures to keep pace with the changing technology. Data are continually being reexamined for accuracy and subjected to stringent quality controls. The processing system has been designed to provide the optimum service to a wide variety of users of climatological information. Specialized analyses are carried out for particular applications. This paper describes current AES data processing techniques involving climatological variables of particular interest to hydrologists. A summary of AES hydrometeorological data available in published form and various other media is also provided. (Knapp-USGS) W74-01290

STORAGE AND RETRIEVAL OF GROUND-

WATER DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.

G. Grove, and R. L. Herr.

In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 21-25, 1971. 2 fig. 4 ref.

Descriptors: *Hydrologic data, *Data processing, *Data storage and retieval, *Canada, Groundwater, Aquifer characteristics, International Hydrological Decade.

The automated general purpose groundwater data processing system of the Groundwater Subdivi-sion, Inland Waters Branch, Canada, consists of three operational files. The well data file contains data on the construction and instrumentation of the well and data on the hydrogeological properties of the aquifers penetrated by the well. lithological log for the well is stored on the well log file. The catalog file provides an index of the data contained on the other files. Programming of a hydrograph file is nearing completion. Data from such diverse sources as federal research projects and provincial water well driller's reports are stored using parameter and mnemonic codes. A maximum of 999 mathematical, statistical, and map subroutines can be used by the retrieval napp-USGS)
W74-01291

ACQUISITION, STORAGE AND PROCESSING

OF GLACIER INVENTORY DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.

C. S. L. Ommanney.

In: Computer Storing and Processing of Hydrolog-ical Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 27-29, 1971, 4 ref.

Descriptors: *Data collections, *Data processing, *Data storage and retrieval, *Glaciers, *Canada, Mapping, Surveys, International Hydrological

A proposal to inventory all the glaciers in Canada was included in the Canadian Program for the In-ternational Hydrological Decade. Formal guidelines specify the type of data to be collected and the required format. These form the basis of the Canadian glacier inventory program. All the information required for each glacier is coded on one standard data sheet. The basic data is listed in a standard format for keypunching onto four cards. Based on interpretation of aerial photographs the map outlines of each glacier are checked and the constituent parts (accumulation, ablation areas) are color coded. Once the data

cards have been verified and a visual check of the data printouts completed, the data is transferred to magnetic tape for storage, analysis, and retrieval. It is estimated that there may be between 70,000 and 100,000 glaciers in Canada covering over 200,000 sq km. (Knapp-USGS) W74-01292

STORAGE AND PROCESSING OF WATER

QUALITY DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
R. H. Peters, and A. Demayo.

In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 31-45, 1971. 12 fig, 2 tab, 3 ref.

Descriptors: *Hydrologic data, *Data processing, *Canada, *Data storage and retrieval, Data collec-tions, Water quality, Statistics, Water chemistry, Water pollution, International Hydrological Decade

The storage and processing system for water quali-ty data developed by the Water Quality Division, Department of the Environment, Canada, has been operational for 2 years. It is designed to accept chemical, physical, bacteriological, biological, and hydrometric data relevant to water quality for surface waters, groundwaters, wastewaters, and sediments. The free format input and a station numbering system that is designed to uniquely locate any sampling site make input and retrieval from the system specific and flexible. Data input to the system may be made from precoded laboratory forms, standard 80 character coding sheets, or coded magnetic tape from automated field or laboratory instruments. Data reports may be obtained as lists or statistical summaries. The system is being used by four federal and provincial agen-cies. (Knapp-USGS) W74-01293

COMPUTER UTILIZATION OF HYDROLOGI-CAL DATA FOR NORTH NASHWAAKSIS REPRESENTATIVE BASIN,

New Brunswick Univ., Fredericton. Dept. of Civil

Engineering. K. S. Davar, and J. C. Li.

In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 53-70, 1971. 17 fig.

Descriptors: *Data processing, *Hydrologic data, *Forecasting, Small watersheds, *Canada, Statistics, Mathematical models, Demonstration watersheds, International Hydrological Decade.
Identifiers: *North Nashwaaksis representative basin (Canada).

In planning computer utilization of hydrological data, the choice of methodology must be governed by the objectives, scale, and constraints of the project. Data routing in the study of the North Nashwaaksis Representative Basin, Canada, which has a drainage area of 10.4 square miles is described. The two principal program objectives for this project are: (1) research relating to the hydrological regime in the basin, and (2) data inventory for the representative basin. Experience on this project leads to the clear conclusion that such programs necessitate the employment of trained semipermanent staff as important links in the chain of operations. A major objective of data acquisition in this program is to derive from the long-term accumulative data log an estimate of hydrology on the continental scale. (Knapp-W74-01294

DATA ACQUISITION AND STORAGE FOR RESEARCH WATERSHEDS, Guelph Univ. (Ontario). School of Engineering.

W. T. Dickinson, and G. J. Molnar.

In: Computer Storing and Processing of Hydrolog-ical Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 71-76, 1971. 4 fig, 5 tab.

Descriptors: *Data processing, *Data storage and retrieval, Canada, Small watersheds, Data collections, Rainfall-runoff relationships, Water yield, Runoff forecasting, International Hydrological Decade.

In watershed research, there is a need for a system of acquiring data and transforming them to a stored form suitable for analyses compatible with the research objectives and for reference for other purposes. Factors to be considered in satisfying this need are outlined, and candidate acquisition systems are considered, including both direct and indirect approaches. Comparisons are made between the systems with regard to time, cost, and other factors. Particular attention is given to the recent optical character recognition indirect acquisition methodology. (Knapp-USGS) W74-01295

PLANNED DATA STORAGE METHODS FOR THE INTERNATIONAL FIELD YEAR FOR THE

McMaster Univ., Hamilton (Ontario). Center for Applied Research and Engineering Design. B. H. Nodwell, and J. MacDowall.

In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 81-92, 1971. 8 fig, 1 tab, 2 ref. CARED Contract.

Descriptors: *Data storage and retrieval, *Data processing, *Great Lakes, International Hydrological Decade, Canada, Data collections, Hydrologic

A method of storing the data collected during the IFYGL is proposed. The Data Bank consists of a three-level system, the first level being a catalogue; the second, a summarized form of data stored on magnetic tape, hard copy, and microfilm for easy use, access, storage, and transport; the third, detailed unsummarized observations stored on magnetic tape. These data are to be both com-pact and scientifically useful. Summarization methods and formats that meet these conditions are described for a number of sensor packages, and methods of storage are discussed. Size and cost of the final summarized data bank are estimated along with distribution costs of this level of data. (Knapp-USGS) W74-01296

EVALUATION OF THE ACCURACY OF GRAN PLOTS BY MEANS OF COMPUTER CALCULA-TIONS. APPLICATION TO THE POTEN-TIOMETRIC TITRATION OF THE TOTAL AL-KALINITY AND CARBONATE CONTENT IN

SEA WATER, Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.

For primary bibliographic entry see Field 02K. W74-01365

CLIMATOLOGICAL STATIONS IN CALIFOR-

California State Dept. of Water Resources, Sacremento.

J. D. Goodridge.

Available from State of Calif, Documents Section, P. O. Box 20191, Sacramento, Calif 95820 Price \$2.50. California Department of Water Resources Bulletin No 165, July 1971. 114 p, 3 plate.

Field 07—RESOURCES DATA

Group 7C-Evaluation, Processing and Publication

Descriptors: *Climatic data, *Meteorological data, *Rain gages, *California, Measurement, Data col-lections, Rainfall, Sites, Temperature, Evapora-tion, Networks, Indexing, Oregon, Nevada,

This issue of the 'Index of Climatological Stations in California' is a compilation of 6,352 weather sta-tions in California in 1971 engaged chiefly in measuring rainfall. It also includes some stations situated in Oregon, Nevada, and Arizona, and in the states of Baja California and Sonora in Mexico. Some of these stations also report other types of data, such as temperature and evaporation. The information presented in the index results from the cooperative effort of 90 agencies whose records are listed. (Woodard-USGS)

COMPUTER IDENTIFICATION OF BACTERIA ON THE BASIS OF THEIR ANTIBIOTIC SUSCEPTIBILITY PATTERNS,

National Institutes of Health, Bethesda, Md. Clinical Pathology Dept.

For primary bibliographic entry see Field 05A.

EXTENDED TABLES FOR KENDALL'S TAU. Commonwealth Scientific and Industrial Research Organization, North Ryde (Australia).

D. J. Best. Biometrika, Vol 60, No 2, p 429-430, August 1973. 2 tab, 5 ref.

Descriptors: *Regression analysis, Statistical methods.

Identifiers: *Kendall's tau, *Normal approximation, *Errors, Rank correlation coefficient, Ties, Normal distribution.

Tables for testing the significance of Kendall's tau without ties have been extended beyond n less than or equal to 40 to n equals 100. This permits study of the errors involved in the use of the normal distribution, previously the only way of testing significance tests has also been studied and exsting tables for ties in one ranking extended beyond n equals 10. (Little-Battelle) W74-01497

DON'T FORGET D/A CONVERTER TEMPCO. Burr-Brown Research Corp., Tucson, Ariz. C. R. Teeple.

Electronic Design, Vol 21, No 9, p 130-132, April 26. 1973, 4 fig.

Descriptors: Temperature, Electronic equipment. Identifiers: *Accuracy, *Errors, *Digital to analog converters, *Analog to digital converters.

Accuracy drift of digital to analog and analog to digital converters occurs when temperature fluctuates and results from offset drift, gain drift, and linearity error. To assure system accuracy, the converter must function in a satisfactory temperature range. If converter resolution is known temperature range to confine errors to plus or minus I LSB can be obtained from an included graph. The graph can also be used to determine converter drift. (Little-Battelle) W74-01507

USING COMPUTERS TO ANALYZE CONTINU-

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center. J. J. Catherines, S. A. Clevenson, and H. F. Scholl. Instruments and Control Systems, Vol 46, No 9, p 83-85, September 1973. 7 fig, 2 ref.

Descriptors: "Data processing, "Computer programs, Statistical methods, Data storage and retrieval, Computers, Electronic equipment. Identifiers: "Data acquisition, "Recorders, Data interpretation.

Continuous data on vertical, longitudinal, and lateral accelerations of railroad cars and vibrations of STOC aircraft were recorded by one of two systems. In the first, transducer outputs were applied to voltage-controlled oscillators to produce frequencies corresponding to IRIG standards. These outputs were multiplexed with a 12.5 kHz reference and recorded on one track of a stereo tape recorder. In the second system, transducer outputs were recorded on a 7-channel FM recorder. The data were re-recorded in the labora-tory in wide-band FM form with 6.75 kHz carrier frequency and continuous time code. A generalpurpose time series analysis program was used to process and analyze the data by computer and provide autocorrelations, cross correlations, power spectral densities, histograms, standard devia-tions, mean values, maximum magnitudes, rms levels, and transfer functions. An exceedance program computed the number of times and period during which the signal exceeded a specified level. Power spectral density curves identified dominant frequencies. (Little-Battelle)

HYDROLOGICAL INFORMATION FOR THE PLANNING OF WATER RESOURCES IN DEVELOPING COUNTRIES (L'INFORMATION HYDROLOGIQUE POUR LA PLANIFICATION DES RESOURCES HYDRAULIQUES DANS LES PAYS EN VOIE DE DEVELOPPEMENT),

Office de la Recherche Scientifique et Technique OUtre-Mer, Paris (France).

Paper presented at International Symposium on Water Resources Planning, Mexico City, December 1972, 16 p.

Descriptors: *Data collections, *Basic data collections, *Hydrologic data, Investigations, Sampling, Groundwater resources, Groundwater availability, Surface waters, Surface water availability, Appraisals, Resources, Water resources, Ground-water resources, Water quality, Pollutants. Identifiers: *Developing countries (West Africa),

Twenty-five years of hydrologic investigative ex-perience acquired by the French Hydrologic Ser-vice in what was once all French colonial Africa is used to demonstrate the requirements of data collection for planning in developing countries which are short of water. Studies were conducted with emphasis on sourface water resources, groundwater resources, and waters threatened by pollu-tion, overusage, or other imposed stresses. Hydrologic data collection programs must be designed with definite planning data uses defined, either for present or future development considerations. If such uses are not considered, insufficient and unplanned data will force regions into slow realization of development. Initially a program should be designed to offer short term data to answer immediate questions concerning water resources problems. As the country develops, schemes to acquire data for long range planning objectives can be incorporated into large scale regional planning objective analysis. (Muller-Arizona) W74-01623

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT. VOLUME 2. HYDROLOGIC DATA MANAGE-

MENT, Corps of Engineers, Davis, Calif. Hydrologic Engineering Center. For primary bibliographic entry see Field 02E.

COMPUTER IDENTIFICATION OF YEASTS OF THE GENUS SACCHAROMYCES, Heroit-Watt Univ., (Soctland). Dept. of Brewing and Biological Sciences.
For primary bibliographic entry see Field 05A.
W74-01646

08. ENGINEERING WORKS

8A. Structures

SOUTH AMERICAN MARINE ENERGY.

Louisiana State Univ., Baton Rouge, Coastal Stu-R. J. Russell.

Available from NTIS as AD-700 259, \$6.00 in paper copy, \$1.45 in microfiche. Technical Report No 73, December 1, 1969. 40 p, 2 fig, 31 tab. ONR Nonr-1575 (03).

Descriptors: *Coastal engineering, Geomorphology, Topography, Tides, Energy, *Waves (Water), *Engineering structures, Sea level, South Amer-

Identifiers: Sea state, Swell,

The report summarizes information needed by geomorphologists concerned with explaining coastal features or by engineers designing structures exposed to physical attack by the sea. Summaries of tidal ranges, state of the sea, swell characteristics, and comments on wave energy are based on tables prepared by the Coast and Geodetic Survey (ESSA), the Navy Hydrographic Office, and Army Engineering Research and Development Laboratories. Suggestions are in-cluded designating parts of the coast where effects of sea and swell may be differentiated, but no morphological forms are discussed. The active physical processes involved in changing coasts bulated here are to be used along with knowledge of passive factors, such as lithology and topography, for explaining coastal forms or for purposes of engineering design. (Sinha-OEIS) W74-01181

MOHAWK LAKE STUDY, BRANTFORD, ON-TARIO.

For primary bibliographic entry see Field 02J.

TRI-AGENCIES PIPELINE: ENGINEERING RE-

San Diego County Water Authority, Calif.

February, 1972, 13p. 5 fig. 2 tab. 6 ref. 3 append.

Descriptors: *Pipelines, *Water supply, *Water distribution (Applied), Aqueducts, *California, Water districts, Inter-agency cooperation. Identifiers: *San Diego County (Calif), Hydraulic gradient, Back-feeding.

Three public agencies in San Diego County, California, the City of Oceanside, Carlsbad Mu-nicipal Water District, and the Vista Irrigation District, proposed a single pipeline to convey water to themselves from the Second San Diego Aqueducts. A County Water Authority study concluded that substantial savings totaling \$1,088,000 would be realized if the three agencies cooperated in construction of the single pipeline, rather than building separate lines. Additionally, maintenance costs and environmental damage would be less. Also future water needs of the participating agen-cies would be sufficient to require additional aqueduct service connection capacity for each agency within 3 to 5 years. Four routes were developed for the pipeline, only one of which was selected for presentation herein. The proposed pipeline would be provided at a hydraulic gradient considerably above the elevation of that required within the service area. It will allow the present Vista and Oceanside water systems to be backfed, which means that those existing supply networks will be adequate for much longer periods. Much of the added demand for water in all three agencies' service districts has occurred at high elevations at extreme ends of those systems, making maintenance of heads difficult. The pipeline will facilitate storage of water in reservoirs along

ENGINEERING WORKS—Field 08 Hydraulic Machinery—Group 8C

its route for later use at peak demand periods. Pumping does not appear necessary except when water is being placed in higher reservoirs. Diameters of the pipeline will range from 42 to 18 inches. Appendices include recommended design criteria and standards for the pipeline, engineering maps and diagrams of the pipeline, engineering maps and diagrams of the pipeline, and a proposed form of a ''joint powers'' agreement between the three agencies. (Stein-North Carolina) W74-01477

8B. Hydraulics

OBSERVATIONS AND EXPERIMENTS ON SOLITARY WAVE DEFORMATION,

Stanford Univ., Calif. Dept. of Civil Engineering. R. L. Street, and F. E. Camfield.

Available from NTIS as AD-645 086, Paper copy \$6.00, Microfiche \$1.45. Technical Note No. 85 (1)-66, December 1966. 25 p, 7 fig, 18 ref. Nonr 225 (85), NR089-041.

Descriptors: *Coasts, *Beaches, *Waves (Water), deformation, Shallow water, Slopes, Sea walls, Engineering structures.
Identifiers: Solitary waves, *Shoaling.

A series of experiments were run in a two-dimensional wave channel to study solitary wave defor-mation on plane slopes ranging from horizontal to vertical. The test objectives included verification of deformation theories, delination of the shoaling processes associated with various slopes, and examination of the limit-height-wave concept. The results showed that the deformation process can be classified as a function of the ratio of initial wave height to water depth and beach slopes. The deformation theory for reflection from a vertical wall was verified, but the theory for low slopes was found to be only qualitatively accurate. Finally, a redefinition of the limit-height wave on sloping beaches is suggested. (Sinha-OEIS) W74-01215

FLOW VISUALIZATION IN FREE SHEAR

Hong Kong Univ. Dept. of Mechanical Engineer-

J. A. Clark, and E. Markland.

ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10119, p 1897-1913, November 1973. 7 fig, 2 tab, 19 ref, append.

Descriptors: *Turbulent flow, *Vortices, *Jets,
*Turbulent boundary layers, Turbulence, Boundary layers, Transition flow, Hydraulics,
Hydrodynamics.

The laminar-turbulent transition of the free shear layer in two-dimensional wall jets was studied. Detailed information on vortex formation was provided by visualization in water using the hydrogen vided by visualization in water using the hydrogen bubble technique. The observed vortex structures in the shear layer during transition are dominated by transverse elements which grow exponentially as they travel downstream. Longitudinal parts are also apparent giving rise to three-dimensional flow in the shear layer. Further downstream the vortices break down three-dimensionally, creating the onset of turbulence. (Knapp-USGS) W74-01271

A ROLE OF SEDIMENT TRANSPORT IN AL-LUVIAL CHANNELS, Geological Survey, Washington, D.C.

For primary bibliographic entry see Field 02J. W74-01272

ANALYSIS OF SEDIMENT SORTING IN ALLU-VIAL CHANNELS, Colorado State Univ., Fort Collins. Dept. of Civil

Engineering. For primary bibliographic entry see Field 02J.

W74-01274

NUMERICAL SOLUTION OF MULTIPHASE

WELL FLOW, New Mexico Inst. of Mining and Technology, Socorro. Dept. of Ground-Water Hydrology. W. Brutsaert.

ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10162, p 1981-2001, November 1973. 4 fig, 16 ref, append.

Descriptors: *Groundwater movement, *Water wells, *Drawdown, *Oil wells, Mathematical models, Finite element analysis, Simulation analysis, Porous media, Oil-Water interfaces. Identifiers: *Multiphase flow.

A method is presented for numerically solving im-miscible multiphase well flow considering three compressible fluids, two liquids, and one gas, and assuming isothermal conditions. Capillary and dissolution of gas in liquid are considered in the proposed mathematical model. Numerical difficulties arising from the nonlinearity of the equations and from the finite differencing in cylindrical coordinates are easily dealt with by using a modified Newton method to solve the fully implicit finite difference equations. Coning problems in the petroleum industry and unconfined flow problems in hydrology are typical applications. (Knapp-USGS) W74-01275

BOUNDARY CONTRACTIONS AS CONTROLS

IN TWO-LAYER FLOWS,
California Univ., Los Angeles. School of Engineering and Applied Science.
S. C. Mehrotra.

ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10160, p 2003-2012, November 1973. 2 fig, 8 ref, append. NSF Grant GA-31247

Descriptors: *Stratified flow, *Flow control, Flow characteristics, Hydraulics, Flow around objects, Open channel flow. Identifiers: *Flow contractions.

Two-layer flows past contractions may be calculated using a vector-matrix equation. The steady problem can be reduced to a set of two equations, a detailed study of which reveals the correspondence and noncorrespondence between the two types of contractions. For two-layer flows with bounded upper layer, only the section where the contraction is the severest can act as a control. When the upper layer is free, this is true only with regard to vertical obstructions. Two-layer flows past horizontal contractions with free upper layer can be controlled at two sections—one at the throat and the other away from it. However, when the flow throughout is subcritical with respect to the now inrougnout is subcritical with respect to the free surface wave mode (a common situation), vertical and horizontal contractions are equivalent, the only control being at the severest section. (Knapp-USGS) W74-01276

LINEAR PROGRAMMING AND CHANNEL FLOW IDENTIFICATION, California Univ., Los Angeles. Dept. of Engineer-

ing Systems. W. W.-G. Yeh, and L. Becker.

ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10177, p 2013-2021, November 1973. 1 fig, 2 tab, 12 ref, append.

Descriptors: *Open channel flow, *Linear programming, Mathematical models, Hydraulics, Op-timization, Parametric hydrology, Unsteady flow.

A method was developed for the optimal identification of parameters in unsteady open channel flow. The parameters chosen for identification are two constants embedded in the generalized friction slope expression which encompasses both the Manning and Chezy equations. A minimax error criterion was formulated and solutions are obtained by the use of the influence coefficient algorithm and linear programming. The required information is a set of concurrent input and output measurements and appropriate initial and bounda-ry conditions of the system. Numerical results demonstrate the efficiency of the formulation and the rapidity of the rate of convergence. (Knapp-USGS) W74-01277

SEDIMENT TRANSPORT: NEW APPROACH AND ANALYSIS, Hydraulics Research Station, Wallingford (En-

For primary bibliographic entry see Field 02J. W74-01279

OXNARD BASIN EXPERIMENTAL EXTRAC-

TION-TYPE BARRIER, California State Dept. of Water Resources, Sacra-

G. Torres, Jr., and P. J. Yates.

Available from Office of Procurement, Docu-ments Section, P. O. Box 20191, Sacramento, Calif., 95820 Price \$3.00. Bulletin No 147-6, September 1970. 157 p, 12 fig, 3 tab, 6 ref, 12 append.

Descriptors: *Water pollution control, *Saline water intrusion, *Sea water, *Aquifers, *California, Water wells, Pumping, Groundwater recharge, Rainfall, Water quality control, Water resources development, Groundwater barriers, Groundwater movement.

Identifiers: *Ventura County (Calif), Extractiontype barrier.

An experimental extraction-type barrier was con-structed along approximately 2,600 feet of coastline near the city of Port Hueneme in Ventura County, California, to determine the hydraulic feasibility of creating a pressure trough in a con-fined aquifer by means of extraction wells, and the effectiveness of such a trough in preventing seawater intrusion. Five extraction wells, each with a pumping capacity of 1,100 gpm, and a discharge were installed by the Department of Water Resources and operated for 2 years by the United Water Conservation District. During the field test, 9,000 acre-feet of degraded water was extracted. This extraction, combined with 2 years of above normal rainfall, reduced the areal extent affected by intruded water from 6,100 to 4,800 acres. Operation of the experimental barrier section demonstrated the hydraulic feasibility of this method of controlling seawater intrusion. Approximate costs per mile of barrier and needed well spacing and capacity for a full-scale barrier were developed; however, additional information on the extent and transmissibility of the aquifers to be protected would be required to permit final selection of the spacing and capacity of extraction wells. The use of noncorrosive materials, rather than a cathodic protection system, was also found advisable. (Woodard-USGS)
W74-01289

TURBULENT FLUID FRICTION OF ROTATING DISKS, Case Western Reserve Univ., Cleveland, Ohio.

For primary bibliographic entry see Field 08C. W74-01640

8C. Hydraulic Machinery

TURBULENT FLUID FRICTION OF ROTATING

DISKS, Case Western Reserve Univ., Cleveland, Ohio. P. Cooper.

Field 08-ENGINEERING WORKS

Group 8C-Hydraulic Machinery

Available from NTIS, Springfield, Va. 22151, NASA CR-2274 Price \$6.00 printed copy; \$1.45 microfiche. National Aeronautics and Space Administration Contractor Report NASA CR-2274, July 1973. 340 pp. 75 fig, 5 tab, 42 ref, 7 append. NASA NGL 36-003-139.

Descriptors: *Fluid mechanics, *Rotational flow, *Pumps, *Fluid friction, *Turbulent boundary layers, Model studies, Methodology, Numerical analysis, Correlation analysis, Reynolds number, Turbulent flow, Hydraulic equipment, Viscosity. Identifiers: Rotating disk.

The incompressible flow field between two infinite parallel disks, one of them rotating and the other stationary, is analyzed and solved for situations where the radial Reynolds number Re±wr square/v (w)disk angular speed; r±radius from axia to rotation and v±kinematic viscosity of the fluid) is large enough to produce turbulent flow. An effective viscosity method is used, the effective viscosity being regarded as a scalar. Hence the stresses for both the laminar and turbulent regimes are in the direction of the local velocity gradient. The validity of such an approach is demonstrated for the case of boundary layer development on a rotating disk in an infinite fluid otherwise at rest. An implicit finite-difference method is used to obtain a numerical solution of the boundary layer flow from the axis out to a radius corresponding to Re±10 to the 7th power. For an assumed transition from laminar to turbulent flow at the experimentally observed value of Re ± 3x100,000, the resulting skewed velocity profiles and disk friction drag agree well with measurements. Also solved by the same numerical technique is the case of the surrounding fluid rotating at one-half the disk speed. (Woodard-USGS). W74-01640

8D. Soil Mechanics

STRATIGRAPHY AND ECONOMIC GEOLOGY OF THE COASTAL PLAIN OF THE CENTRAL SAVANNAH RIVER AREA, GEORGIA, Georgia Univ., Athens. Dept. of Geology. For primary bibliographic entry see Field 02J. W74-01122

ENGINEERING CHARACTERISTICS OF OVERBURDEN IN KNOX COUNTY, TENNES-SEE, Geological Survey, Washington, D.C.

Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C. W74-01143

8E. Rock Mechanics and Geology

OVERBURDEN RELATED TO TYPE OF BEDROCK AND ENGINEERING CHARACTERISTICS OF THE BEDROCK, KNOX COUNTY, TENNESSEE,

Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01144

8I. Fisheries Engineering

GREATER ADAPTABILITY OF FRESHWATER MUSSELS TO NATURAL RATHER THAN TO ARTIFICIAL DISPLACEMENT, Bureau of Sport Fisheries and Wildlife, Washing-

Bureau of Sport Fisheries and Wildlife, Washington, D.C. Office of Endangered Species. M. J. Imlay.

M. J. Imlay.
Nautilus. Vol 86, No 2-4, p 76-79, 1972.
Identifiers: Adaptability, *Artifical displacement,
Fishery, *Mussels (Fresh water).

Artificial displacement of freshwater mussels in the stream bottom (substrate smothering, commercial harvesting, or removal and replacement) was determined to harm mussels more often than was natural displacement (natural sand formation, storm disturbance, etc.). A biological explanation is presented that contributes to understanding why water projects (dredging, channelization, impoundments, quarry washing) are so devastating to freshwater mussels.—Copyright 1973, Biological Abstracts, Inc. W74-01235

MONITORING CHANNEL CATFISH USE OF A DEMAND FEEDER, Bureau of Sport Fisheries and Wildlife, Stuttgart,

Bureau of Sport Fisheries and Wildlife, Stuttgart, Ark. Fish Farming Experiment Station. W. H. Hastings, B. Hinson, D. Tackett, and B.

Simco.
Prog Fish-Cult. Vol 34, No 4, p 204-206. 1972. Il-

lus.
Identifiers: *Channel catfish, *Monitoring, De-

Identifiers: *Channel catfish, *Monitoring, Demand feeders (Fish), *Fish food.

A mechanism is described that permits the continuous monitoring of time intervals that feed leaves a demand feeder. Data collected from the use of this mechanism suggest that catfish fingerlings feed more frequently during the afternoon hours of the summer months and at a daily rate of about 4% of their body weight. Winter feeding with large catfish occurs at fairly regular intervals throughout the day and at a daily rate of about 1-1/4% of their body weight.—Copyright 1973, Biological Abstracts, Inc.

SUPERSATURATION OF NITROGEN IN WATER DURING PASSAGE THROUGH HYDROELECTRIC TURBINES AT MACTAOUAC DAM.

Environmental Protection Service, Halifax (Nova Scotia).

For primary bibliographic entry see Field 05C. W74-01432

RELIABILITY OF AN AMMONIA PROBE FOR ELECTROMETRIC DETERMINATION OF TOTAL AMMONIA NITROGEN IN FISH TANKS.

Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inti. For primary bibliographic entry see Field 05A. W74-01433

INCREASE OF RESISTANCE OF CARP TO DROPSY BY MEANS OF BREEDING. II. COURSE OF SELECTION AND EVALUATION OF THE BREED GROUPS, (IN RUSSIAN), Gosudarstvennyi Nauchno-Issledovatelskii Institut Ozernogo i Rechnogo Rybnogo Khozyaist-

va, Leningrad (USSR). For primary bibliographic entry see Field 05C. W74-01560

FISHERIES AND FISH CULTURE IN ISRAEL

IN 1971, Laboratory for Research Fis. Dis., Nir David (Israel). For primary bibliographic entry see Field 06B.

FURTHER STUDIES OF FISH PREDATION ON SALMON STOCKED IN MAINE LAKES, Maine Dept. of Inland Fisheries and Game, Ban-

gor.
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9A. Education (Extramural)

GRADUATE COURSES RELATED TO WATER RESOURCES.

Massachusetts Univ., Amherst. Water Resources Research Center.

Available from the National Technical Information Service as PB-225 115/5, \$2.75 in paper copy, \$1.45 in microfiche. 1972. 17 p. OWRR A-999-MASS (10).

Descriptors: *Training, Water resources, *Universities, *Massachusetts, *Education, Facilities, Water Resources Research Act, *Water Resources Instituties.

Identifiers: *Graduate courses, Water resourcesrelated courses, Course listing.

This listing of 104 graduate courses (in 19 Departments) related to water resources offered at the University of Massachusetts in Amherst, was prepared in response to the large number of requests for this type of information directed to the University's Water Resources Research Center. Several new courses are added each year. (Woodard-USGS) W74-01119

THE ROLE OF UNIVERSITIES IN WATER RESOURCES EDUCATION: THE SOCIAL SCIENCES.

North Carolina Univ., Chapel Hill. For primary bibliographic entry see Field 06B. W74-01467

EDUCATIONAL PROGRAMS FOR LAND AND WATER RESOURCES DEVELOPMENT AND MANAGEMENT,

Arizona Univ., Tucson. For primary bibliographic entry see Field 06B. W74-01628

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Massachusetts Inst. of Tech., Cambridge.
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2 4-D	ADSORPTION	AIR
2,4-dichlorophenoxyacetate metabolism by	Adsorption of Colloidal Iron by Bacteria,	Supersaturation of Nitrogen in Water During
Arthrobacter sp.: Accumulation of a Chlorobu- tenolide,	W74-01253 5B	Passage Through Hydroelectric Turbines at Mactaquac Dam.
W74-01550 5B	Virus Concentration from Sewage, W74-01533 5D	W74-01432 5C
ABIES-AMABILIS	W/4-01333	AIR POLLUTION
The Vegetation of Findley Lake Basin,	AERATION	The Determination of Cadmium by Atomic Ab-
W74-01587 5C	Mobile Oxygen Dispersion Craft,	sorption in Air, Water, Sea Water and Urine
W/4-0138/	W74-01232 5G	with a R.F. Carbon Bed Atomizer,
ABRASION		W74-01441 5A
Analysis of Sediment Sorting in Alluvial Chan-	Soil Aeration Response to Draining Intensity in	
nels,	Basin Peat, W74-01255 2G	ALABAMA
W74-01274 2J	W 74-01255 20	The Impact of Water Pollution Abatement on
ARGORPHICAL	Swedish Lake Restoration Program Gets	Competition and Pricing in the Alabama Textile
ABSORPTION	Results,	Industry,
Concentrations of Plutonium, Cobalt, and Silver Radionuclides in Selected Pacific	W74-01262 5G	W74-01101 5G
Seaweeds,	Report on Laurel Creek Channel Improve-	Sketch Development Plan, Chambers County,
W74-01297	ments, Waterloo and Bridgeport, Ontario.	Alabama.
Studies of Rapid NTA-Utilizing Bacterial Mu-	W74-01482 4A	W74-01485 5D
tant,	177-01402	
W74-01348 5B	AERIAL PHOTOGRAPHY	ALASKA
	Tidewater Shorelines in Broward and Palm	Shoreline Processes Near Barrow, Alaska: A
Some Thoughts on Nutrient Limitation in Al-	Beach Counties, Florida: An Analysis of	Comparison of the Normal and the
gae,	Characteristics and Changes Interpreted from	Catastrophic, W74-01193 2L
W74-01428 5C	Color, Color Infrared and Thermal Aerial	W74-01193 2L
ACCURACY	Imagery,	Seasonal Variation of Chemical Parameters in
Don't Forget D/A Converter Tempco,	W74-01220 2L	Alaskan Tundra Lakes,
W74-01507 7C	AEROBIC BACTERIA	W74-01347 5B
117-01307	The Role of Micro-Organisms in Waste Tip-	
ACID-BASE EQUILIBRIUM	Lagoon Systems Purifying Coke-Oven Ef-	Seismic Evidence for Glacier Motion,
Thermodynamics of Acid-Base Equilibria. II.	fluents,	W74-01378 2C
Ionization of m- and p-Hydrox-	W74-01647 5D	On the Formation of Small Marginal Lakes on
ybenzotrifluoride and the Concept of Fluorine	A PROBLE CONDITIONS	the Juneau Icefield, South-Eastern Alaska,
Double Bond-No Bond Resonance,	AEROBIC CONDITIONS Degradative Versatility of Corynebacterium	U.S.A
W74-01226 2K	pseudodiphtheriticum NCIB 10803 which uses	W74-01379 2C
ACID MOORLAND	Amides as Carbon Source,	
The Structure of an Acid Moorland Pond Com-	W74-01536 5B	Pathways of Trace Elements in Arctic Lake
munity,		Ecosystems,
W74-01508 5C	AEROSPACE TECHNOLOGY	W74-01401 5B
	Study of Water Recovery and Solid Waste	ALCOHOLS
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A Waterborne Actinomycete Resembling	W74-01280 5D	ing Bacterial Metabolites with a Modified Auto-
Strains Causing Mycetoma,	1177-01200	matic Injector and Gas Chromatograph,
W74-01256 5B	AFLATOXIN M1	W74-01336 5A
ACTIVATED SLUDGE	Criteria for Mycotoxin Standards,	ALDRIN
Fate of Lignin in Kraft Effluent Treatment,	W74-01414 5A	The Effect of Aldrin on Water Balance in the
W74-01320 5B	AFRICA	Freshwater Pulmonate Gastropod
	Hydrological Information for the Planning of	(Biomphalaria glabrata),
Investigations on the Sheathed Bacterium	Water Resources in Developing Countries (L-	W74-01525 5C
Haliscomenobacter hydrossis Gen.n., Sp.n.,	'Information Hydrologique Pour La Planifica-	
Isolated from Activated Sludge,	tion des Resources Hydrauliques Dans Les	ALFLATOXIN B1
W74-01539 5B	Pays en Voie de Developpement),	Evaluation of the Response of Dugesia Tigrina
Bacteriology of Activated Sludge, in Particular	W74-01623 7C	to Aflatoxin B1, W74-01404 SC
the Filamentous Bacteria,	Water Resources Planning Mozambique (La	W74-01404 5C
W74-01540 5B	Planification Des Resources en Eau au	ALGAE
	Mozamique),	Recreational Reuse of Municipal Wastewater,
Microfauna of Activated Sludge. Part III. The	W74-01629 6B	W74-01103 5D
Effect of Physico-Chemical Factors on the Oc-		
currence of Microfauna in the Annual Cycle, W74-01542 5C	AGE	An Improved Method of Cell Enumeration for
W 74-01342 3C	Temperature Selection by Juvenile and Adult	Filamentous Algae and Bacteria,
Biodegradation of O-Benzyl-P-Chlorophenol,	Yellow Perch (Perca Flavescens) Acclimated to 24 C,	W74-01421 5A
W74-01552 5B	W74-01353 5A	Some Thoughts on Nutrient Limitation in Al-
A DATE WOOD A STORY		gae,
ADMINISTRATION	AGRONOMY	W74-01428 5C
And Not a Drop to Drink: Water Resources	Soil and Water Conservation on Arable Lands,	Alest President of Cara to take the
Planning and Administration, W74-01465 6E	W74-01633 3F	Algal Excretion of C-14-Labeled Compounds and Microbial Interactions in Cyanidium cal-
W. 7-01403	AGRYPNETES-CRASSICORNIS	and Microbial Interactions in Cyanidium cal- darium Mats,
ADMINISTRATIVE AGENCIES	Factors Affecting the Distribution of Some	W74-01510 5C
And Not a Drop to Drink: Water Resources	Phryganeaeid (Trichoptera) in Malham Tarn,	
Planning and Administration,	Yorkshire,	Hydrobiological Studies on the Lednicke Ryb-
W74-01465 6E	W74-01586 2I	niky Ponds: Species Composition and Seasonal

ALGAE

Variation in the Abundance of Plankton (In	AMINO ACIDS	Modified Delves Cup Atomic Absorption
Czech),	Role of Silt in Microcystis Aeruginosa	Determination of Lead in Blood,
W74-01567 5C	Development, (In Russian),	W74-01415 5A
Selected Species of Algae Found in Carp Ponds	W74-01368 5C	Emission Spectrometric Determination of
of the Laskowa Complex Near Zator,	AMMONIA	Trace Metals in Biological Tissues,
W74-01607 2I	Reliability of an Ammonia Probe for Elec-	W74-01546 5A
ALGAL GROWTH	trometric Determination of Total Ammonia	
The Relations of Periphytic and Planktonic	Nitrogen in Fish Tanks, W74-01433 5A	ANIONS
Algal Growth in an Estuary to Hydrographic	W/4-01433	Anion Responses and Potential Functions for Neutral Carrier Membrane Electrodes,
Factors,	AMMONIACAL NITROGEN DECAY	W74-01334 2K
W74-01571 5C	Application of Mathematical Modelling to	
ALIPHATIC AMINES	Water Quality Management, W74-01486 5B	New Detector for Ion-Exchange Chromatog-
Precolumn Inlet System for the Gas Chromato-		raphy, W74-01343 5A
graphic Analysis of Trace Quantities of Short-	ANACYSTIS	W74-01343 5A
Chain Aliphatic Amines,	Loss of Photosynthetic Activity in Two Blue- Green Algae as a Result of Osmotic Stress,	ANNUAL
W74-01357 5A	W74-01302 5B	Division of the United States into Regions Ac-
ALIPHATIC HYDROCARBONS		cording to Cophasal Fluctuations of Annual
Gas-Solid Chromatography on Macroreticular	ANAEROBIC BACTERIA	Runoff (Rayonirovaniye territorii SShA po sin-
Cation Exchange Resins,	Pankhurst Tubes Modified to Indicate Anaerobiosis,	faznosti kolebaniy godovogo stoka rek), W74-01140 2E
W74-01495 5A	W74-01545 5A	W/4-01140
ALKALI METALS		ANNUAL CYCLES
Distribution Studies of Radium and Other	ANAEROBIC CONDITIONS	Microfauna of Activated Sludge. Part III. The
Metallic Elements Between Thenoyl-	Pankhurst Tubes Modified to Indicate Anaerobiosis,	Effect of Physico-Chemical Factors on the Oc-
trifluoroacetone in Methyl Isobutyl Ketone and	W74-01545 SA	currence of Microfauna in the Annual Cycle, W74-01542 5C
Aqueous Solutions,		W74-01542 5C
W74-01494 5A	ANALOG TO DIGITAL CONVERTERS	ANODIC STRIPPING VOLTAMMETRY
ALKALINE EARTH METALS	Don't Forget D/A Converter Tempco, W74-01507 7C	Chemical Constants of Metal Complexes from
Distribution Studies of Radium and Other	W 74-01307	a Complexometric Titration Followed with
Metallic Elements Between Thenoyl-	ANALYTICAL STANDARDS	Anodic Stripping Voltammetry, W74-01332 5A
trifluoroacetone in Methyl Isobutyl Ketone and Aqueous Solutions,	Criteria for Mycotoxin Standards,	W74-01332 5A
W74-01494 5A	W74-01414 5A	ANODONTA-GRANDIS
	ANALYTICAL TECHNIQUES	Distribution and Morphological Variation of
ALLUVIAL CHANNELS	Simple Inexpensive Freeze-Drying Procedure,	Lampsilis radiata (Pelecypoda, Unionidae) in
Analysis of Sediment Sorting in Alluvial Chan-	W74-01339 7B	Some Central Canadian Lakes: A Multivariate
nels, W74-01274 2J	Simple Direct Combination of Gas Chromatog-	Statistical Approach, W74-01608 2H
23	raphy and Vapor Phase Infrared Spectrometry,	W 74-01000 2H
ALLUVIUM	W74-01355 5A	ANP-2 COMPOUND
Alluvion, Islands, and Sand Bars, W74-01612 6E	Use of Isotopic Methods to Determine Present	Substantiation of the Maximum Permissible
W74-01612 6E	Rates of Snow Accumulation in Antarctica	Concentration of ANP-2 Compound in Water Bodies, (In Russian),
ALONA GUTTATA SARS	(Ispol'zovaniye izotopnykh metodov dlya	W74-01581 5G
The Distribution, Composition and Biomass of	opredeleniya sovremennoy skorsti nakopleniya	
the Crustacean Zooplankton Population in Western Lake Superior,	snega v Antarktide), W74-01393 2C	ANTARCTIC
W74-01109 5C		Use of Isotopic Methods to Determine Present
	State of Rare Earth Elements in Surface	Rates of Snow Accumulation in Antarctica
ALPINE LAKES	Waters (O sostoyanii redkozemel'nykh elemen- tov v poverkhnostnykh vodak'i),	(Ispol'zovaniye izotopnykh metodov dlya opredeleniya sovremennoy skorsti nakopleniya
Notes on the Dynamics of the Reproductive	W74-01395 2K	snega v Antarktide),
Activity of Arctodiaptomus Bacillifer in High Altitude Alpine Lakes,		W74-01393 2C
W74-01209 2H	Analytical Applications of Philsed Voltammetric Stripping at Thin Film Mercury Electrodes,	ANTIBIOTICS (PESTICIDES)
	W74-01514 SA	Computer Identification of Bacteria on the
ALUMINUM Soluble Aluminum in Marine and Fresh Water		Basis of Their Antibiotic Susceptibility Pat-
by Gas-Liquid Chromatography,	ANIMAL METABOLISM	terns,
W74-01446 5A	Dieldrin. Effects of Chronic Sublethal Expo- sure on Adaptation to Thermal Stress in Fresh-	W74-01443 5A
	water Fish,	ANTIMONY
AMIDES Degradative Versatility of Corynebacterium	W74-01408 5C	Concentrations of Some Trace Metals in
pseudodiphtheriticum NCIB 10803 which uses	Matabalism and Biliam Promise of Cal	Pelagic Organisms and of Mercury in Northeast
Amides as Carbon Source,	Metabolism and Biliary Excretion of Sul- fobromophthalein by Rainbow Trout (Salmo	Atlantic Ocean Water,
W74-01536 5B	Gairdneri),	W74-01523 5C
AMINES	W74-01411 5C	ANTITRANSPIRANTS
Atomic Absorption Method for Determining	ANIMAL MIGRATION	Potential Usefulness of Antitranspirants for
Micromolar Quantities of Aliphatic Secondary	Spring Flooding and Fauna (In Russian),	Solution of Some Water Supply, Plant Growth,
Amines,	W74-01261 2I	and Environmental Problems,
W74-01492 5A	ANIMAL TICCLIFC	W74-01105 3B
Substantiation of the Maximum Permissible	ANIMAL TISSUES Determination of Mercury After Room Tem-	AQUATIC ALGAE
Concentration of ANP-2 Compound in Water	perature Digestion by Flameless Atomic Ab-	The Ecology of the Diatoms of the Klip River,
Bodies, (In Russian),	sorption,	Southern Transvaal,
W74-01581 5G	W74-01315 5A	W74-01313 5C

Growth and Buoyancy of Microcystis aeru-	Solvent Extraction of Metal 1,10-	A Resonant Capsule Pressure Transducer For
ginosa Kutz. Emend. Elenkin in a Shallow	Phenanthroline Complexes and Concentration	Data Buoys,
Eutrophic Lake,	of Trace Amounts of Metal Ions Prior to Spec-	W74-01160 7B
W74-01518 5C	trophotometric or Flame Photometric Deter- mination,	The Mass Balance of the Sea Ice of the Arctic
The Chemical Oxygen Demand of Waters and	W74-01354 5A	Ocean,
Biological Materials from Ponds, W74-01543 5C		W74-01374 2C
	Precolumn Inlet System for the Gas Chromato- graphic Analysis of Trace Quantities of Short-	ARCTODIAPTOMUS-BACILLIFER
AQUATIC ANIMALS	Chain Aliphatic Amines,	Notes on the Dynamics of the Reproductive
Removal of Phosphate and Secondary B.O.D.	W74-01357 5A	Activity of Arctodiaptomus Bacillifer in High
from Tertiary treated Wastewater by Aquatic Animals.		Altitude Alpine Lakes,
W74-01124 5D	The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a	W74-01209 2H
	Flameless Wire Loop Atomizer,	ARGON
Food Consumption of the Free-Living Aquatic Nematode Pelodera Chitwoodi,	W74-01363 5A	Nitrogen/Argon Ratios by Difference Thermal
W74-01225 5A	Ligand Photooxidation in Copper (II) Com-	Conductivity, W74-01522 5A
Effects of Paraguat on Invertebrates in a Can-	plexes of Nitrilotriacetic Acid. Implications for	
tebury Stream, New Zealand,	Natural Waters,	ARID CLIMATES
W74-01298 5C	W74-01400 5B	Soil and Water Conservation on Arable Lands,
	Quantitative Analysis of Aqueous	W74-01633 3F
The Structure of an Acid Moorland Pond Com-	Nitrite/Nitrate Solutions by Infrared Internal	Brush Eradicating, Basin Pitting, and Seeding
munity, W74-01508 5C	Reflectance Spectrometry,	Machine for Arid to Semiarid Rangeland,
	W74-01402 2K	W74-01637 4A
AQUATIC BACTERIA	Atomic Abounties Mathed for Determining	ABSTRACTO
Effects of Protozoa on the Fate of Particulate	Atomic Absorption Method for Determining	ARIDITY
Carbon,	Micromolar Quantities of Aliphatic Secondary	Profile of the Vegetation of the Elburs Moun-
W74-01117 5C	Amines, W74-01492 5A	tain Range (Northern Iran), (In German), W74-01385
Acridine Orange-Epifluorescence Technique	W/T-VITA	W/4-01363
for Counting Bacteria in Natural Waters,	Distribution Studies of Radium and Other	ARIZONA
W74-01534 5A	Metallic Elements Between Thenoyl-	A Stochastic Model of Streamflow Based on
	trifluoroacetone in Methyl Isobutyl Ketone and	the Theory of Functions of Markov Processes,
AQUATIC ENVIRONMENT	Aqueous Solutions,	W74-01123 2E
Techniques for Measuring Light Absorption	W74-01494 5A	
Scattering, and Particle Concentrations in	1 - El 1 - B 1 4	Development of a Time-Space Prediction
Water,	Ion-Electrode Based Automatic Glucose Analy-	Technique to Evaluate Snowpacks in and Ad-
W74-01283 7B	sis System, W74-01513 5A	jacent to Forest Openings,
AQUATIC FUNGI	W74-01513 5A	W74-01231 3B
Two New Chytrids from the Appalachian	AQUIFER CHARACTERISTICS	Arizona's Coming Dilemma: Water Supply and
Highlands,	Hydrogeologic Characteristics of the Valley-	Population Growth,
W74-01305 5A	Fill Aquifer in the Weldona Reach of the South	W74-01452 4A
	Platte River Valley, Colorado,	
AQUATIC INSECTS	W74-01142 4B	A Cost-Effectiveness Study and Analysis of
Assessment of Two Mesh Sizes for Interpreting		Municipal Refuse Disposal Systems,
Life Cycles, Standing Crop, and Percentage	Ground-Water Yield Potential in Knox County,	W74-01631 5E
Composition of Stream Insects,	Tennessee,	A DOMAGNA AMBURA
W74-01601 2I	W74-01147 7C	AROMATIC AMINES
An Automatic Separator for the Removal of	AQUIFER TESTING	Atomic Absorption Method for Determining
Aquatic Insects from Detritus,	Calculation of Permeability of Cretaceous	Micromolar Quantities of Aliphatic Secondary Amines.
W74-01624 7B	Sandstones from Pumping and Static Level	W74-01492 5A
	Data in Selected Areas of Western South	W/4-01492
AQUATIC MICROBIOLOGY	Dakota,	AROMATIC HYDROCARBONS
Effects of Protozoa on the Fate of Particulate	W74-01113 2F	Gas-Solid Chromatography on Macroreticular
Carbon,		Cation Exchange Resins,
W74-01117 5C	AQUIFERS	W74-01495 5A
AQUATIC PLANTS	Oxnard Basin Experimental Extraction-Type	ABARNIA
The Structure of an Acid Moorland Pond Com-	Barrier,	ARSENIC
munity,	W74-01289 8B	Collaborative Study of a Colorimetric Method
W74-01508 5C	ARCTIC OCEAN	for Determining Arsenic Residues in Red Meat and Poultry,
The Effect of China-Clay Wastes on Stream In-	Arctic Ocean Arctic Data Buoys and Aidjex,	W74-01403 5A
	W74-01156 7B	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
vertebrates, W74-01527 5C		Concentrations of Some Trace Metals in
	The Soviet Darms ProgramTwenty Years of	Pelagic Organisms and of Mercury in Northeast
AQUEOUS SOLUTIONS	Development, Deployment, and Data,	Atlantic Ocean Water,
Critical Study of the APCD-MIBK Extraction	W74-01157 7C	W74-01523 5C
System for Atomic Absorption,	The Asstic Date Buoy A Contem for Project	ARTESIAN AQUIFERS
W74-01329 5A	The Arctic Data Buoy, A System for Environ- mental Monitoring in the Arctic.	Balance Estimate of Groundwater Resources
Investigation of Spectral Overlap of the Neon	W74-01158 7B	on the Northwestern Slope of the Caucasus
359.352-nm and Chromium 359.349-nm Spectral	7B	(Balansovaya otsenka resursov podzemnykh
Lines in Atomic Absorption and Atomic	Barometric Pressure Measurements from	vod severo-zapadnogo sklona Bol'shogo Kav-
Fluorescence Spectrometry of Chromium,	Buoys During AIDJEX 1972,	kaza),
W74-01337 2K	W74-01159 7B	W74-01136 4B

ARTESIAN AQUIFERS

Problems in Regional Dynamics of Artesian	Heavy Metals in Wastewater and Treatment	AUTOMATIC CONTROL
Water (Problemy regional'noy dinamiki artezi-	Plant Effluents,	Automated Rapid Scan Instrument for Spec-
anskikh vod),	W74-01319 5A	troelectrochemistry in the Visible Region,
W74-01141 2F	Critical Study of the APCD-MIBK Extraction	W74-01331 2K
ARTHROBACTER	System for Atomic Absorption,	Ion-Electrode Based Automatic Glucose Analy-
2,4-dichlorophenoxyacetate metabolism by	W74-01329 5A	sis System,
Arthrobacter sp.: Accumulation of a Chlorobu-		W74-01513 5A
tenolide,	Investigation of Spectral Overlap of the Neon	
W74-01550 5B	359.352-nm and Chromium 359.349-nm Spectral	AUTOMATIC SAMPLERS
	Lines in Atomic Absorption and Atomic	Automatic Samplers for Sewage and Effluents,
ARTHROPODS	Fluorescence Spectrometry of Chromium,	W74-01306 5A
Distribution Patterns and Population Dyanmics of the Micro-Arthropods of a Desert Soil in	W74-01337 2K	AUTOMATIC SEPARATION
Southern California,	Determination of Low Concentrations of	An Automatic Separator for the Removal of
W74-01635 2I	Cobalt in Plant Material by Atomic Absorption	Aquatic Insects from Detritus,
	Spectrophotometry,	W74-01624 7B
ARTIFICAL DISPLACEMENT	W74-01356 2K	
Greater Adaptability of Freshwater Mussels to		AVALANCHES
Natural Rather Than to Artificial Displace-	The Determination of Lead and Nickel by	Comparison of the Snow Resistograph with the
ment,	Atomic-Absorption Spectrometry with a Flameless Wire Loop Atomizer,	Ram Penetrometer,
W74-01235	W74-01363 5A	W74-01381 2C
ARTIFICIAL RECHARGE	1177 DS	BACKWATER
Underground Storage of Texas Playa Lake	Modified Delves Cup Atomic Absorption	Stability and Reach Length in Water Surface
Waters by Injection Into the Ogallala Forma-	Determination of Lead in Blood,	Profile Determination,
tion Under Moderate Pump Pressure,	W74-01415 5A	W74-01152 2E
W74-01627 4B	m - m	
ARTIFICIAL REEFS	The Determination of Cadmium by Atomic Ab- sorption in Air, Water, Sea Water and Urine	BACTERIA
	with a R.F. Carbon Bed Atomizer,	Investigations on the Influence of Tides on
Algal Succession on Artificial Reefs in a Marine Lagoon Environment in Guam,	W74-01441 5A	Salinity, Content of Suspended Matter, Sedi-
W74-01429 5C	TA SA	mentation and Bacteria Counts in the Elbe
W/4-01425	Atomic Absorption Method for Determining	Estuary, (Untersuchungen Uber Die Einwir-
ASSAY	Micromolar Quantities of Aliphatic Secondary	kung Der Tide Auf Salzgehalt, Schwebstoff-
Versatile Computer Generated Variable Ac-	Amines,	gehalt, Sedimentation Und Bakteriengehalt in Der unterelbe).
celerating Voltage Circuit for Magnetically	W74-01492 5A	W74-01175 2L
Scanned Mass Spectrometers. Use for Assays	ATOMIC EMISSION SPECTROPHOTOMETRY	
in the Picogram Range and for Assays of Stable	Critical Study of the APCD-MIBK Extraction	Survival of Coliform Bacteria in Natural
Isotope Tracers,	System for Atomic Absorption,	Waters: Field and Laboratory Studies with
W74-01335 2K	W74-01329 5A	Membrane-Filter Chambers,
2,4-dichlorophenoxyacetate metabolism by		W74-01250 5B
Arthrobacter sp.: Accumulation of a Chlorobu-	ATOMIC FLUORESCENCE SPECTROSCOPY	Adsorption of Colloidal Iron by Bacteria,
tenolide,	Investigation of Spectral Overlap of the Neon	W74-01253 5B
W74-01550 5B	359.352-nm and Chromium 359.349-nm Spectral	W/4-01255
	Lines in Atomic Absorption and Atomic	A Diseased Trout: Microbiological Study of Its
ATLANTIC OCEAN	Fluorescence Spectrometry of Chromium, W74-01337 2K	Principal Organs and Its Environment,
Concentrations of Dissolved Forms of Fe, Mn, and Cu in Marine Pore Waters of the Atlantic	W74-01337 2K	W74-01267 5C
Basin (Kontsentratsii rastvorennykh form Fe,	ATRIPLEX-POLYCARPA	Microbial Culture Media Preparation,
Mn, i Cu v morskikh, porovykh vodakh bas-	Autecology of Atriplex polycarpa from Califor-	
seyna Atlanticheskogo okeana),	nia,	W74-01505 5A
W74-01392 2K	W74-01259 2I	Algal Excretion of C-14-Labeled Compounds
		and Microbial Interactions in Cyanidium cal-
ATMOSPHERIC PRESSURE	ATTITUDES	darium Mats,
Barometric Pressure Measurements from	Report of Attitudes and Opinions of Recrea-	W74-01510 5C
Buoys During AIDJEX 1972,	tionists Towards Wild and Scenic Rivers: A	Vishiller of Variability d Minarconstant of
W74-01159 7B	Case Study of the St. Joe River, W74-01102 6B	Viability of Lyophilized Microorganisms after Storage.
A Resonant Capsule Pressure Transducer For	W/4-01102	W74-01538 5C
Data Buoys,	Concept-Scale Interaction with the Semantic	W 74-01336
W74-01160 7B	Differential Technique,	Sensitivity of Three Selected Bacterial Species
	W74-01644 6B	to Ozone,
ATOMIC ABSORPTION	ATIOMPATTA	W74-01553 5F
SPECTROPHOTOMETRY	AUSTRALIA	Biodegradation of Phenylmercuric Acetate by
The Determination of Thallium in Urine and	Water Use by Perennial Evergreen Plant Com- munities in Australia and Papua New Guinea.	Mercury-Resistant Bacteria,
Plasma by Delves Cup Atomic Absorption, W74-01314 5A	W74-01634 , 2D	W74-01555 5B
W74-01314 5A	, ,	W 14-01555
Evaluation of the Use of the Heated Graphite	AUSTRALIA (VICTORIA)	BACTERIA COUNTING
Atomizer for the Routine Determination of	Die-Back in the Mixed Hardwood Forests of	Acridine Orange-Epifluorescence Technique
Trace Metals in Water,	Eastern Victoria: A Preliminary Report,	for Counting Bacteria in Natural Waters,
W74-01316 5A	W74-01251 4A	W74-01534 5A
A Comparison of Fast Destruction Methods for	AUTOECOLOGY	BACTERIAL PHYSIOLOGY
A Comparison of Past Destruction Methods for the Determination of Trace Metals in Biological	Autecology of Atriplex polycarpa from Califor-	Studies on Methanol-Oxidizing Bacteria. I.
Materials,	nia,	Isolation and Growth Studies,
W74-01317 5A	W74-01259 2I	W74-01535 5C

Degradative Versatility of Corynebacterium pseudodiphtheriticum NCIB 10803 which uses Amides as Carbon Source, W74-01536 5B	A Profile of the Four Moment Measures Per- pendicular to a Shore Line, South Haven, Michigan, W74-01184 2H	BENTHIC FAUNA Effect of Spoil Disposal on Benthic Inver- tebrates, W74-01420 5C
W 74-01336	W/4-01104	17701720
Bacteriology of Activated Sludge, in Particular the Filamentous Bacteria,	Littoral Zone Tidal-Cycle Sedimentation, W74-01192 2J	Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow
W74-01540 5B	A Note on Edge Waves in a Stratified Fluid,	County, Ohio (Scioto River Basin), W74-01517 5B
BACTERIAL POPULATIONS	W74-01194 2E	W/4-0131/
Some Observations on Bacterial Populations in		Bottom Fauna as an Indicator of Water Quality
Wilgreen Lake, Madison, KY.,	The Equilibrium Beach,	in Sweden's Large Lakes (Lakes Malaren, Vat-
W74-01242 5B	W74-01195 2J	tern and Vanern),
W/4-01242 3B	Till C 1 4 Ct 1 T 77 17	W74-01531 5B
BACTERICIDES	Tidal Cycle of Changes in an Equilibrium	
Biodegradation of O-Benzyl-P-Chlorophenol,	Beach, Sandy Hook, New Jersey,	BENTHIC FLORA
W74-01552 5B	W74-01198 2L	Sublittoral Benthic Marine Algae of Southern
	Beach Equilibrium and Second-Order Wave	Cape Cod and Adjacent Islands: Pseu-
BACTERIOLOGY	Theory,	dolithoderma Paradoxum Sp. Nov. (Ralf-
Water. Examination. Assessment. Condition-	W74-01201 2E	siaceae, Ectocarpales), W74-01350 5A
ing. Chemistry. Bacteriology. Biology,		W /4-01550 5A
W74-01236 5F	Long Surf,	BENTHOS BIOMASS
	W74-01203 2E	Zoobenthos of the Azov Sea After the Control
BALTIMORE HARBOR (MD)	m c	of THE Don River, (In Russian),
Estuarine Circulation Induced by Diffusion,	The Generation of Longshore Currents on a	W74-01257 2L
W74-01222 2L	Plane Beach,	
BANCI ADECII	W74-01208 2L	BERNALILLO COUNTY (N MEX)
BANGLADESH	Littoral Processes and the Development of	Engineer's Report for South Valley Water
A Hybrid Model for Irrigation Planning Using	Shorelines,	System.
Chance Constrained Programming and	W74-01212 2J	W74-01382 6B
Hydrologic Simulation,		
W74-01488 4B	Sand Movement Along Equilibrium Beaches	BIBLIOGRAPHIES
BARRIER ISLANDS	North of San Francisco,	Literature on Mercury: Availability of English
Observations of Net Shoreline Positions and	W74-01213 2J	Translations, W74-01323 5A
Approximations of Barrier Island Sediment	0	W74-01323 5A
Budgets,	Observations and Experiments on Solitary	BICARBONATES
W74-01372 2L	Wave Deformation,	Algal Excretion of C-14-Labeled Compounds
	W74-01215 8B	and Microbial Interactions in Cyanidium cal-
BASIC DATA COLLECTIONS	Edge Waves Over a Sloping Beach in a Rotat-	darium Mats,
Hydrological Information for the Planning of	ing Two-Layered System,	W74-01510 5C
Water Resources in Developing Countries (L-	W74-01218 2E	
'Information Hydrologique Pour La Planifica-		BIG SIOUX RIVER (SDAK)
tion des Resources Hydrauliques Dans Les	Experimental Study of Wave Reflection by a	Nutrient Sources and Transport in the Upper
Pays en Voie de Developpement),	Sloping Beach,	and Central Regions of the Big Sioux River,
W74-01623 7C	W74-01223 2E	W74-01115 5B
	Longshore Current Consention by Obliquely In	BILE
BATRACHOSPERMUM-VAGUM	Longshore Current Generation by Obliquely In- cident Internal Waves,	Metabolism and Biliary Excretion of Sul-
Batrachospermum Vagum Ag. in the Szczecin	W74-01650 2E	fobromophthalein by Rainbow Trout (Salmo
Pomerania, A Locality New to Poland, (In	W/4-01030	Gairdneri),
Polish),	BEANS	W74-01411 5C
W74-01219 2H	The Carbohydrate and Water Balance of Beans	
BAYS	(Vicia faba) Attacked by Broomrape	BIO-DISC TREATMENT
The Circulation of Surface Waters in Raleigh	(Orobanche crenata),	Evaluation of the Bio-Disc Treatment Process
Bay, North Carolina,	W74-01575 3F	for Summer Camp Application,
W74-01210 2L		W74-01118 5D
26	BED LOAD	BIOACCUMULATION
Inventory and Evaluation of Information on	A Role of Sediment Transport in Alluvial Chan-	Uptake of Methyl Mercuric Chloride and Mer-
Delaware Bay, Volume 2.	nels,	
W74-01369 6E	W74-01272 2J	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake
	Sediment Transport: New Approach and Anal-	by Erythrocytes in Vitro,
The Management of Bay and Estuarine	ysis,	W74-01412 5C
Systems in the Texas Coastal Zone, Phase II.	W74-01279 2J	W/4-01412
W74-01620 5G		Mechanism of NTA Degradation By a Bacterial
BEACH CUSPS	BEDROCK	Mutant,
	Overburden Related to Type of Bedrock and	W74-01515 5B
Beach Cusps,	Engineering Characteristics of the Bedrock,	P10.100.11
W74-01180 2J	Knox County, Tennessee,	BIOASSAY
BEACHES	W74-01144 7C	Nutrient Removal Using Lemna Minor,
The Breaking of Waves on a Sloping Beach,	BELGIUM (OSTENDE HARBOR)	W74-01321 5C
W74-01176 2E	Contribution to Biological and Chemical Study	Thermophilic Ostracod: Aquatic Metazoan with
26	of the Port of Ostende, (In French),	the Highest Known Temperature Tolerance,
Beach Changes on the Outer Banks of North	W74-01384 5B	W74-01327 5C
Carolina,	20	
W74-01179 2E	BENOMYL	Temperature Selection by Juvenile and Adult
	Thermal and Base-Catalyzed Hydrolysis	Yellow Perch (Perca Flavescens) Acclimated to
Beach Cusps,	Products of the Systemic Fungicide, Benomyl,	24 C,
W74-01180 2J	W74-01504 5B	W74-01353 5A

BIOASSAY

Copper Micronutrient Requirement for Algae,	Biodegradation of Phenylmercuric Acetate by	BIOMASS
W74-01398 5C	Mercury-Resistant Bacteria,	The Distribution, Composition and Biomass of
Evaluation of the Response of Dugesia Tigrina	W74-01555 5B	the Crustacean Zooplankton Population in Western Lake Superior,
to Aflatoxin B1,	BIOINDICATORS	W74-01109 5C
W74-01404 5C	Evaluation of the Response of Dugesia Tigrina	***************************************
militia Peter de Character Caldadad Para	to Aflatoxin B1,	Population Biomass, Number of Individuals,
Dieldrin. Effects of Chronic Sublethal Expo- sure on Adaptation to Thermal Stress in Fresh-	W74-01404 5C	Average Individual Weight, and the Linear Sur-
water Fish.		plus Production Model, W74-01593 2I
W74-01408 5C	Diatom Associations in Yaquina Estuary,	W74-01593 2I
	Oregon : A Multivariate Analysis,	BIOMPHALARIA GLABRATA
Distribution of Alkyl Arsenicals in Model	W74-01430 5B	The Effect of Aldrin on Water Balance in the
Ecosystem, W74-01409 5C	Benthic Macroinvertebrates as Indexes of	Freshwater Pulmonate Gastropod
W74-01409 5C	Water Quality in Whetstone Creek, Morrow	(Biomphalaria glabrata),
Metabolism and Biliary Excretion of Sul-	County, Ohio (Scioto River Basin),	W74-01525 5C
fobromophthalein by Rainbow Trout (Salmo	W74-01517 5B	BIONDICATORS
Gairdneri),	Planet Cartifolia of Calastal Associa	Growth Rates of Intertidal Molluscs as Indica-
W74-01411 5C	Element Constitution of Selected Aquatic Vascular Plants from Pennsylvania: Submersed	tors of Effects of Unexpected Incidents of Pol-
Uptake of Methyl Mercuric Chloride and Mer-	and Floating Leaved Species and Rooted Emer-	lution,
curic Chloride by Trout: A Study of Uptake	gent Species,	W74-01434 5C
Pathways into the Whole Animal and Uptake	W74-01526 5A	BIOTRANSFORMATION
by Erythrocytes in Vitro,		Isotope Fractionation of N-15 and N-14 in
W74-01412 5C	Growth Rates of Sediment-Living Marine	Microbiological Nitrogen Transformations: A
Salinity Adaptation by Dunaliella Tertiolecta. I.	Protozoan as a Toxicity Indicator for Heavy	Theoretical Model,
Increases in Carbonic Anhydrase Activity and	Metals,	W74-01541 5B
Evidence for a Light-Dependent Na (Plus)/H	W74-01529 5A	BLOOD
(Plus) Exchange,	Bottom Fauna as an Indicator of Water Quality	Modified Delves Cup Atomic Absorption
W74-01427 5C	in Sweden's Large Lakes (Lakes Malaren, Vat-	Determination of Lead in Blood,
Kinetics of Silicon-Limited Growth in the	tern and Vanern),	W74-01415 5A
Marine Diatom Thalassiosira pseudonana Hasle	W74-01531 5B	Determination of Obligational Bresides in
and Heimdal (Equals Cyclotella Nana Hustedt),		Determination of Chlorinated Pesticides in Whole Blood,
W74-01431 5C	Relationships of Indicator and Pathogenic Bac-	W74-01417 5A
P. L	teria in Stream Waters, W74-01645 5B	***************************************
Behavioral Responses to Changes in Hydro-	W74-01645 5B	BLOWOUTS
static Pressure and Light During Larval Development of the Lobster Homarus Gam-	BIOLOGICAL COMMUNITIES	On the Formation of Small Marginal Lakes on
marus,	The Ecology of the Diatoms of the Klip River,	the Juneau Icefield, South-Eastern Alaska,
W74-01436 5C	Southern Transvaal,	U.S.A., W74-01379 2C
	W74-01313 5C	W 14-01319
Algal Excretion of C-14-Labeled Compounds	01 4 41 61	BLUEFISH
and Microbial Interactions in Cyanidium cal- darium Mats,	Observations on the Ecology of Laminaria Sin-	Relation Between Total Body Weight and Con-
W74-01510 5C	clairii on Three Northern Oregon Beaches, W74-01423 5C	centrations of Manganese, Iron, Copper, Zinc,
	11/4-01425	and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish
The Effect of Aldrin on Water Balance in the	Stream Community Response to Nutrient En-	Antimora Rostrata,
Freshwater Pulmonate Gastropod	richment,	W74-01413 5B
(Biomphalaria glabrata), W74-01525 5C	W74-01499 5C	
W/4-01323	70 - 0	BLUEGILL
Growth Rates of Sediment-Living Marine	The Structure of an Acid Moorland Pond Com-	Population Biomass, Number of Individuals,
Protozoan as a Toxicity Indicator for Heavy	munity, W74-01508 5C	Average Individual Weight, and the Linear Sur- plus Production Model,
Metals, W74-01529 5A	W/4-01500	W74-01593 2I
W74-01529 5A	BIOLOGICAL PROPERTIES	
Distribution of (C-14) PCBs in Carp,	Electrophoretic and Immunological Analyses of	BLUEGILLS
W74-01530 5C	Seven Chlorosarcinacean Algae,	Swimming Endurance and Resistance to
BIOGUSAICAL CHARACTERICTICS	W74-01426 5A	Copper and Malathion of Bluegills Treated by
BIOCHEMICAL CHARACTERISTICS Electrophoretic and Immunological Analyses of	BIOLOGICAL SAMPLES	Long-Term Exposure to Sublethal Levels of Hydrogen Sulfide,
Seven Chlorosarcinacean Algae,	Fluorometric Quantitation of Gallium in Biolog-	W74-01579 5C
W74-01426 5A	ical Materials at Nanogram Levels,	
	W74-01344 2K	BOATING REGULATIONS
BIOCHEMICAL OXYGEN DEMAND		Operation of Watercraft. W74-01455 6E
Removal of Phosphate and Secondary B.O.D. from Tertiary treated Wastewater by Aquatic	Simplified Spectrophotometric Analysis of	W74-01455 6E
Animals,	Plants for Selenium,	BODIE ISLAND (NC)
W74-01124 5D	W74-01406 2K	Beach Changes on the Outer Banks of North
	BIOLOGICAL STUDIES	Carolina,
BIOCONTROL	Contribution to Biological and Chemical Study	W74-01179 2E
Effect of Flooding on the Twospotted Spider Mite and its predators on Strawberry in	of the Port of Ostende, (In French),	BODIES OF WATER
Southern California,	W74-01384 5B	A Study of the Exchange of Dissolved Solids
W74-01243 3F	PIOLOGICAL EDDAMENT	Between Bottom Sediments and Water of Dif-
	BIOLOGICAL TREATMENT	ferent Water Bodies (Izucheniye obmena rast-
BIODEGRADATION Biodegradation of O Benevil B Chlorenband	Evaluation of the Bio-Disc Treatment Process	vorennymi veshchestvami mezhdu donnymi ot-
Biodegradation of O-Benzyl-P-Chlorophenol, W74-01552 5B	for Summer Camp Application, W74-01118 5D	lozheniyami i vodoy razlichnykh vodoyemov), W74-01389 2J
32	35	

BOECKELLA TANEA	BRINES	CADMIUM. AIR
A New Species of Boeckella (Copepoda: Cala-	Murfee v. Phillips Petroleum Company (Action	The Determination of Cadmium by Atomic Ab-
noida) from Northland, New Zealand,	by Property Owners Against Oil and Gas Les-	sorption in Air, Water, Sea Water and Urine
W74-01309 5A	sees for Diminution of Market Value of Land	with a R.F. Carbon Bed Atomizer,
	Due to Pollution of Underground Fresh Water	W74-01441 5A
BONDING	Supply).	
Thermodynamics of Acid-Base Equilibria. II.	W74-01459 6E	CALCULUS OF VARIATIONS
Ionization of m- and p-Hydrox-		On the Optimal Operation of Groundwater
ybenzotrifluoride and the Concept of Fluorine	BRITISH GUIANA (GEORGETOWN)	Basins: A Calculus of Variations Approach,
Double Bond-No Bond Resonance,	Erosion of Tidal Flats Near Georgetown,	W74-01489 4B
W74-01226 2K	British Guiana,	G. 1 PRO 1 PROVID
POPEROI E CEOBRIVEICE	W74-01216 2J	CALIBRATIONS
BOREHOLE GEOPHYSICS	W 74-01210	Reliability of an Ammonia Probe for Elec-
Prediction of Well Development Possibilities in	BROOK STICKLEBACK	trometric Determination of Total Ammonia
Delaware by means of Calibrated Gamma-Ray	Unusual Occurrence of the Brook Stickleback	Nitrogen in Fish Tanks,
Logs,		W74-01433 5A
W74-01106 4B	(Culaea inconstans) in the Mackenzie River,	
BOTTOM FAUNA	Northwest Territories,	CALIFORNIA
The Bottom Macrofauna of the Oligotrophic	W74-01589 2I	Computer Simulation of Estuarial Networks,
Lake Konnevesi, Finland,	PROOF PROUE	W74-01197 2L
W74-01287 5C	BROOK TROUT	
W /4-0128/	Persistence of Headwater Check Dams in a	Littoral Processes and the Development of
BOTTOM SEDIMENTS	Trout Stream,	Shorelines,
Mathematical Modeling of Nutrient - Trans-	W74-01566 2I	W74-01212 2J
port,		0 1 M
W74-01121 5B	BROOMRAPE	Sand Movement Along Equilibrium Beaches
W/4-01121 3B	The Carbohydrate and Water Balance of Beans	North of San Francisco,
C 18-Isoprenoid Ketone in Recent Marine Sedi-	(Vicia faba) Attacked by Broomrape	W74-01213 2J
ment,	(Orobanche crenata),	
W74-01301 5A	W74-01575 3F	Effect of Flooding on the Twospotted Spider
W 14-01301		Mite and its predators on Strawberry in
A Study of the Exchange of Dissolved Solids	BRYOCENOLOGICAL STUDIES	Southern California,
Between Bottom Sediments and Water of Dif-	Bryocenological Research in Some Areas of the	W74-01243 3F
ferent Water Bodies (Izucheniye obmena rast-		
vorennymi veshchestvami mezhdu donnymi ot-	Iron Gate of the Danube, (In Rumanian),	Geothermal Resource Investigations,
lozheniyami i vodoy razlichnykh vodoyemov),	W74-01453 2I	W74-01273 4B
W74-01389 2J	REIGHANGE	
W/4-01365	BUOYANCY	Oxnard Basin Experimental Extraction-Type
Microbial Flora and Level of Vibrio	Growth and Buoyancy of Microcystis aeru-	Barrier,
Parahaemolyticus of Oysters (Crassostrea Vir-	ginosa Kutz. Emend. Elenkin in a Shallow	W74-01289 8B
ginica), Water and Sediment from Galveston	Eutrophic Lake,	
	W74-01518 5C	C 18-Isoprenoid Ketone in Recent Marine Sedi-
Bay, W74-01548 5C		ment,
W/4-01348	BUOYS	W74-01301 5A
Occurrence and Cumulation of Microcom-	Arctic Data Buoys and Aidjex,	
ponents in Bottom Sediments of Dam Reser-	W74-01156 7B	Characterization and Treatability of Pomace
voirs of Southern Poland,	15	Stillage,
W74-01565 5B	The Soviet Darms Program-Twenty Years of	W74-01325 5A
W 74-01505 3B	Development, Deployment, and Data,	
BOUNDARY PROCESSES	W74-01157 7C	Climatological Stations in California, 1971,
Effects of Friction and Surface Tide Angle of	W/4-0113/	W74-01383 7C
Incidence on the Coastal Generation of Internal	The Arctic Data Buoy, A System for Environ-	m n
Tides,		The Porter-Cologne Water Quality Control Act,
W74-01190 2E	mental Monitoring in the Arctic,	and Related Water Code Sections (Containing
W/4-01190	W74-01158 7B	the 1971 Amendments).
The Transverse Circulation Near a Coast,	B	W74-01461 5G
W74-01206 2E	Barometric Pressure Measurements from	
	Buoys During AIDJEX 1972,	Tri-Agencies Pipeline: Engineering Report.
BRACKISH WATER	W74-01159 7B	W74-01477 8A
Regional Estimate of Brackish- and Saline-		District Day of Desired Desired
Groundwater Yield (Regional'naya otsenka	A Resonant Capsule Pressure Transducer For	Distribution Patterns and Population Dyanmics
ekspluatatsionnykh resursov solonovatykh i	Data Buoys,	of the Micro-Arthropods of a Desert Soil in
solenykh podzemnykh vod),	W74-01160 7B	Southern California,
W74-01137 4B		W74-01635 2I
70	CACODYLIC ACID	CALIFORNIA (SACRITICA CARREST
Relationships Between Turbidity and Hydro-	Distribution of Alkyl Arsenicals in Model	CALIFORNIA (SAGEHEN CREEK)
graphical Factors in Fresh and Brackish Water	Ecosystem,	Persistence of Headwater Check Dams in a
Region of the Elbe Estuary, (In German),	W74-01409 5C	Trout Stream,
W74-01260 5B		W74-01566 21
	CADMIUM	CALVING (ICEBERGS)
Metabolic Effects of Drinking Brackish Water,	Ion Selective Sensors,	CALVING (ICEBERGS)
W74-01632 5C	W74-01506 5A	Ice Calving into the Proglacial Generator Lake,
		Baffin Island, N.W.T., Canada,
BREAKER ZONE	Analytical Applications of Pulsed Voltammetric	W74-01376 2C
Longshore Current Generation by Obliquely In-	Stripping at Thin Film Mercury Electrodes,	CANADA
cident Internal Waves,		CANADA
W74-01650 2E	W74-01514 5A	Single-Velocity Method in Measuring
	Concentrations of Same Toron Matrix In	Discharge,
BREVIBACTERIUM	Concentrations of Some Trace Metals in	W74-01161 2C
Inhibition by Fatty Acids of the Biodegradation	Pelagic Organisms and of Mercury in Northeast	Total Diela V
of Petroleum,	Atlantic Ocean Water,	International Field Year for the Great Lakes.
W74-01537 5B	W74-01523 5C	W74-01162 2H

CANADA

On Structure, Entrainment, and Transport in	CANADA MOHAWK LAKE (ONT)	CARBON SOURCES
Estuarine Embayments, W74-01178 2L	Mohawk Lake Study, Brantford, Ontario. W74-01476 2J	Degradative Versatility of Corynebacterium pseudodiphtheriticum NCIB 10803 which uses
		Amides as Carbon Source,
Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service,	CANADA (NOVA SCOTIA COAST)	W74-01536 5B
W74-01290 7C	Phytoplankton Nutrients and Flushing of Inlets on the Coast of Nova Scotia,	CARBON TRANSFORMATION
	W74-01471 5B	Effects of Protozoa on the Fate of Particulate
Storage and Retrieval of Groundwater Data,		Carbon,
W74-01291 7C	CANALS	W74-01117 5C
Acquisition, Storage and Processing of Glacier	Thermal Stratification in Industrial Canals,	CARCINOGENS
Inventory Data,	W74-01594 2E	N-Nitrosation by Nitrite Ion in Neutral and
W74-01292 7C	CANNERY WASTES	Basic Medium,
Storage and Processing of Water Quality Data,	Wastewater Characterization of Sweet Potato	W74-01328 5B
W74-01293 7C	Processing,	CARP
C	W74-01324 5A	Distribution of (C-14) PCBs in Carp,
Computer Utilization of Hydrological Data for North Nashwaaksis Representative Basin,	CAPE KENNEDY (FLA)	W74-01530 5C
W74-01294 7C	Availability of Fresh Water in the East Central	
	Florida Planning Region.	Increase of Resistance of Carp to Dropsy by
Diatom Flora of the Grand River, Ontario,	W74-01481 6D	Means of Breeding. II. Course of Selection and
Canada,	CARRARY	Evaluation of the Breed Groups, (In Russian), W74-01560 5C
W74-01311 5A	CARBARYL The Effect of Aldrin on Water Balance in the	W 74-01500
Emergence, Reproduction, and Growth of	Freshwater Pulmonate Gastropod	CARP PONDS
Setipalpian Plecoptera in Southern Ontario,	(Biomphalaria glabrata),	Selected Species of Algae Found in Carp Ponds
W74-01359 5A	W74-01525 5C	of the Laskowa Complex Near Zator,
Ice Calving into the Proglacial Generator Lake,		W74-01607 2I
Baffin Island, N.W.T., Canada,	CARBODITHIOATES	CASCADES
W74-01376 2C	Critical Study of the APCD-MIBK Extraction System for Atomic Absorption,	Report on Laurel Creek Channel Improve-
Comments of Miles to Wise Park	W74-01329 5A	ments, Waterloo and Bridgeport, Ontario.
Supersaturation of Nitrogen in Water During Passage Through Hydroelectric Turbines at		W74-01482 4A
Mactaquac Dam,	CARBOFURAN	CATION CONCENTRATION (SOIL)
W74-01432 5C	Separation and Identification of Carbofuran,	Desorption and Dissolution of Salts from Soils
	Its Metabolites, and Conjugates Found in Fish	as a Function of Soil Water Ratio,
Growth Rates of Intertidal Molluscs as Indica-	Exposed to Ring C-14-Labeled Carbofuran Using ITLC Silica Gel Strips,	W74-01604 2G
tors of Effects of Unexpected Incidents of Pol- lution,	W74-01577 5A	CATION EXCHANGE
W74-01434 5C		Gas-Solid Chromatography on Macroreticular
	CARBOHYDRATES	Cation Exchange Resins,
The Shipowner and Oil Pollution Liability,	The Carbohydrate and Water Balance of Beans	W74-01495 5A
W74-01447 5G	(Vicia faba) Attacked by Broomrape (Orobanche crenata),	
Review of Planning for the Grand River	W74-01575 3F	CATIONS New Detector for Ion-Exchange Chromatog-
Watershed.		raphy,
W74-01478 5D	CARBON	W74-01343 5A
Report on Laurel Creek Channel Improve-	Modifications in Filtration Methods for the	
ments, Waterloo and Bridgeport, Ontario.	Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae,	CATTLE FEED
W74-01482 4A	W74-01425 5A	Nutrient Removal Using Lemna Minor, W74-01321 SC
Distribution and Marphalasical Variation of	311	W74-01321 5C
Distribution and Morphological Variation of Lampsilis radiata (Pelecypoda, Unionidae) in	Coupling Carbon Flow Through Some Pelagic	CAUSATIVE FACTORS
Some Central Canadian Lakes: A Multivariate	and Benthic Communities,	Probable Causes for the 1972 Red Tide in the
Statistical Approach,	W74-01437 5B	Cape Ann Region of the Gulf of Maine,
W74-01608 2H	CARBON-14 METHOD	W74-01435 5C
CANADA (BLACK LAKE-SASK.)	Some Sources of Error in the 14C Method for	CELL COUNTS
Limnology and Fishery Biology of Black Lake,	Estimating Primary Productivity and Their	An Improved Method of Cell Enumeration for
Northern Saskatchewan,	Relationship to Light Intensity During Incuba-	Filamentous Algae and Bacteria,
W74-01234 2H	tion, W74-01217 2H	W74-01421 5A
CANADA (GRAND RIVER WATERSHED)	W74-01217 2H	CELL DIVISION
Physical System Modelling as a Tool in Water	CARBON CYCLE	Sensitivity of Cell Division and Cell Elongation
Resource Planning,	Effects of Protozoa on the Fate of Particulate	to Low Water Potentials in Soybean
W74-01487 2A	Carbon,	Hypocotyls,
CANADA (LAKE BEDARD)	W74-01117 5C	W74-01249 3F
The Planktonic Association (Cladocera and	CARBON DIOXIDE	CELL ELONGATION
Copepoda) of a Dimictic Lake of the Lau-	A New Type of Climatized Gas Exchange	Sensitivity of Cell Division and Cell Elongation
rentides Park, Quebec, (In French),	Chamber for Net Photosynthesis and Trans-	to Low Water Potentials in Soybean
W74-01558 2H	piration Measurements in the Field,	Hypocotyls,
CANADA (MACKENZIE RIVER-N.W.T.)	W74-01568 2I	W74-01249 3F
Unusual Occurrence of the Brook Stickleback	Carbon Dioxide Exchange by Several Stream-	CELL MORPHOLOGY
(Culaea inconstans) in the Mackenzie River,	Side and Scrub Oak Community Species of Red	Bacteriology of Activated Sludge, in Particular
Northwest Territories,	Butte Canyon, Utah,	the Filamentous Bacteria,
W74-01589 2I	W74-01590 2I	W74-01540 5B

CEMENT (PORTLAND)	Wastewater Characterization of Sweet Potato	CHEMICAL DEGRADATION
Effect of Portland Cement on Soil Aggregation	Processing,	Determination of Mercury After Room Tem-
and Hydraulic Properties,	W74-01324 5A	perature Digestion by Flameless Atomic Ab-
W74-01576 2G	Chemical Constants of Metal Complexes from	sorption, W74-01315 SA
CEREAL CROPS	a Complexometric Titration Followed with	W/4-01313
Two Harvest of Cereal Crops per Year with Ir-	Anodic Stripping Voltammetry,	A Comparison of Fast Destruction Methods for
rigation, (In Russian),	W74-01332 5A	the Determination of Trace Metals in Biological
W74-01202 3F	Venetile Computer Commented Veriable Ac-	Materials,
	Versatile Computer Generated Variable Ac- celerating Voltage Circuit for Magnetically	W74-01317 5A
Productivity of Cereal Crops on Eroded Cher-	Scanned Mass Spectrometers. Use for Assays	Thermal and Base-Catalyzed Hydrolysis
nozems Against Both Non-Fertilized and Fertil- ized Backgrounds, (In Russian),	in the Picogram Range and for Assays of Stable	Products of the Systemic Fungicide, Benomyl,
W74-01557 3F	Isotope Tracers,	W74-01504 5B
	W74-01335 2K	CHEMICAL INTERFERENCE
CERIUM	Total Diffusion Interference in Plant	Prevention of Selenium Interference with Mea-
State of Rare Earth Elements in Surface	Lateral Diffusion Interferences in Flame Atomic Absorption and Emission Spec-	surement of Phosphate as its Molybdenum (V-
Waters (O sostoyanii redkozemel'nykh elemen-	trometry.	VI) Complex,
tov v poverkhnostnykh vodakh), W74-01395 2K	W74-01342 2K	W74-01345 5A
W/4-01393		CHEMICAL OVUCEN BENAND
CHANNEL CATFISH	Determination of Low Concentrations of	CHEMICAL OXYGEN DEMAND The Chemical Oxygen Demand of Waters and
Monitoring Channel Catfish Use of a Demand	Cobalt in Plant Material by Atomic Absorption	Biological Materials from Ponds,
Feeder,	Spectrophotometry, W74-01356 2K	W74-01543 5C
W74-01237 8I	W/4-01336	
CHANNEL IMPROVEMENT	Precolumn Inlet System for the Gas Chromato-	CHEMICAL REACTIONS
Report on Laurel Creek Channel Improve-	graphic Analysis of Trace Quantities of Short-	N-Nitrosation by Nitrite Ion in Neutral and
ments, Waterloo and Bridgeport, Ontario.	Chain Aliphatic Amines,	Basic Medium, W74-01328 5B
W74-01482 4A	W74-01357 5A	W 74-01328 3.B
	Simultaneous Determination of Manganese,	Automated Rapid Scan Instrument for Spec-
CHATTAHOOCHEE RIVER (ALA)	Copper, Arsenic, Cadmium, Antimony and	troelectrochemistry in the Visible Region,
Sketch Development Plan, Chambers County,	Mercury in Glacial Ice by Radioactivation,	W74-01331 2K
Alabama.	W74-01361 5A	Double Pulse Coulostatics,
W74-01485 5D		W74-01511 2K
CHELATING AGENTS	Collaborative Study of a Colorimetric Method	W/401311
The Importance of Chelating Agents in Natural	for Determining Arsenic Residues in Red Meat	CHEMICAL STUDIES
Waters and Wastewaters,	and Poultry, W74-01403 5A	Contribution to Biological and Chemical Study
W74-01326 5B	W74-01403 5A	of the Port of Ostende, (In French),
	Rapid Gas Chromatographic Method for Deter-	W74-01384 5B
CHELATION	mination of Residual Methanol in Sewage,	CHEMOTAXONOMY
The Importance of Chelating Agents in Natural Waters and Wastewaters,	W74-01410 5A	Electrophoretic and Immunological Analyses of
W74-01326 5B	Modified Delves Cup Atomic Absorption	Seven Chlorosarcinacean Algae,
W/4-01320	Determination of Lead in Blood,	W74-01426 5A
Copper Micronutrient Requirement for Algae,	W74-01415 5A	CHERNOZEMS
W74-01398 5C		Productivity of Cereal Crops on Eroded Cher-
CHEMICAL ANALYSIS	Determination of Meleic Hydrazide Residues in	nozems Against Both Non-Fertilized and Fertil-
CHEMICAL ANALYSIS Quality of Surface Waters of the United States,	Tobacco and Vegetables,	ized Backgrounds, (In Russian),
1968: Parts 4 and 5. St Lawrence River Basin	W74-01418 5A	W74-01557 3F
and Hudson Bay and Upper Mississippi River	Electrophoretic and Immunological Analyses of	CHESAPEAKE BAY
Basins.	Seven Chlorosarcinacean Algae,	Biochemistry of Estuarine Ecosystem with
W74-01268 2K	W74-01426 5A	Emphasis on Heavy Metals and Shellfish,
		W74-01108 5C
Application of Infrared Fourier Transform	The Determination of Organo-Sulfur Com-	
Spectroscopy to Analysis of Micro Samples, W74-01303 2K	pounds by Thin-Layer Chromatography Via a Ligand-Exchange Precess,	Estuarine Circulation Induced by Diffusion,
W/4-01303	W74-01439 5A	W74-01222 2L
Determination of Mercury After Room Tem-		CHINA CLAY WASTES
perature Digestion by Flameless Atomic Ab-	The Determination of Cadmium by Atomic Ab-	The Effect of China-Clay Wastes on Stream In-
sorption,	sorption in Air, Water, Sea Water and Urine	vertebrates,
W74-01315 5A	with a R.F. Carbon Bed Atomizer, W74-01441 5A	W74-01527 5C
A Modified Filtration Method for the Analysis	W/4-01441 JA	CHIRONOMIDAE
of Wastewater Suspended Solids,	Ion-Electrode Based Automatic Glucose Analy-	Number and Size of Drifting Nymphs of
W74-01318 5A	sis System,	Ephemeroptera, Chironomidae, and Simulidae
	W74-01513 5A	by Day and Night in the River Stranda,
Heavy Metals in Wastewater and Treatment	Emission Spectrometric Determination of	Western Norway,
Plant Effluents, W74-01319 5A	Trace Metals in Biological Tissues,	W74-01230 2I
W/4-01313	W74-01546 SA	CHIRONOMIDS
Improved Distillation Method for Volatile		The Bottom Macrofauna of the Oligotrophic
Acids Analysis,	CHEMICAL CONTAMINATION	Lake Konnevesi, Finland,
W74-01322 5A	Barrier Role of Water Works Installations in	W74-01287 5C
Literature on Mercury: Availability of English	Respect to Chemical Contaminations Classified According to Organoleptic Properties of	CHLORELLA VULGARIS
Translations,	Hazards, (In Russian),	Copper Micronutrient Requirement for Algae,
W74-01323 5A	W74-01584 5D	W74-01398 5C

CHLORINATED HYDROCARBON PESTICIDES

CHEOKINATED HTDROCARDON TESTICIDES	****	
CHLORINATED HYDROCARBON PESTICIDES Variation of Organochlorine Residue Levels	Study of the Speed of Water Circulation in a Water-Bearing Limestone Deposit by Tracing	Beach Cusps, W74-01180 2J
with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus),	Tests (La Serriere River Basin/NE), W74-01563 2F	Effects of Reefs and Bottom Slopes on Wind
W74-01300 5A	CLADOCERA	Set-Up in Shallow Water, W74-01182 2J
Microdetermination of Chloro-S-Triazines in Soil by Gas-Liquid Chromatography with	The Planktonic Association (Cladocera and Copepoda) of a Dimictic Lake of the Lau-	A Profile of the Four Moment Measures Per-
Nickel Electron Capture or Electrolytic Con- ductivity Detection,	rentides Park, Quebec, (In French), W74-01558 2H	pendicular to a Shore Line, South Haven, Michigan,
W74-01304 5A	CV A DOCUMENTAL	W74-01184 2H
Herbicide Analysis: Relationship Between	CLADOCERAN Oxbow Cut-Off Bog Lake Zooplankton of the	On the Small-Scale Horizontal Diffusion Near
Molecular Structure and Retention Index,	Kolyma Basin (In Russian),	the Coast,
W74-01416 5A	W74-01265 2H	W74-01186 5B
Determination of Chlorinated Pesticides in Whole Blood.	CLEARWATER RIVER (IDAHO) Simulating the Behavior of a Multi-Unit, Multi-	Longshore Current Velocity: A Review of
W74-01417 5A	Purpose Water-Resource System,	Theory and Data, W74-01187 2E
Analytical Methodology for Bioactive Com-	W74-01468 6A	Tidal Period Oscillations of an Isohaline Sur-
pounds. Photochemically Assisted Analysis of	CLIMATIC CONDITIONS	face Off the Mouth of the Columbia River,
Chlorinated Hydrocarbon Pesticides in the Presence of Polychlorinated Biphenyls,	The Influence of Some Climatic Factors on the Productivity of Red Clover Seed, (In Serbo-	W74-01188 2L
W74-01493 5A	Croatian),	Note on the Equations of Long Waves Over an
CHLORINATED HYDROCARBONS	W74-01556 3F	Uneven Bottom,
Infrared Studies of Chlorinated Dibenzo-p-	CLIMATIC DATA	W74-01189 2E
Dioxins and Structurally Related Compounds, W74-01509 5A	Climatological Stations in California, 1971, W74-01383 7C	Shifting Offshore Bars and Harbor Shoaling, W74-01191 2J
CHLOROBUTENOLIDES	CLIMATOLOGY	
2,4-dichlorophenoxyacetate metabolism by Arthrobacter sp.: Accumulation of a Chlorobu-	Soil and Water Conservation on Arable Lands, W74-01633 3F	Littoral Zone Tidal-Cycle Sedimentation, W74-01192 2J
tenolide, W74-01550 5B	CLOSTRIDIUM	Shoreline Processes Near Barrow, Alaska: A
CHLORODIBENZO-P-DIOXINS	Practical Methods for Derivatizing and Analyz- ing Bacterial Metabolites with a Modified Auto-	Comparison of the Normal and the Catastrophic,
Infrared Studies of Chlorinated Dibenzo-p-	matic Injector and Gas Chromatograph,	W74-01193 2L
Dioxins and Structurally Related Compounds, W74-01509 5A	W74-01336 5A	Tidal Cycle of Changes in an Equilibrium
	CLOVER SEED (RED)	Beach, Sandy Hook, New Jersey,
CHLOROPHOSPHANZO-III Extraction-Photometric Determination of	The Influence of Some Climatic Factors on the Productivity of Red Clover Seed, (In Serbo-	W74-01198 2L
Uranium (IV) with Chlorophosphonazo-III, W74-01364 5A	Croatian), W74-01556 3F	Experiments and Hydrographic Surveys Off Sandy Hook, New Jersey (1963),
CIII OBODIIVA		W74-01199 2L
CHLOROPHYTA Distribution of Alkyl Arsenicals in Model	CLUSTER ANALYSIS Diatom Associations in Yaquina Estuary,	Beach Equilibrium and Second-Order Wave
Ecosystem, W74-01409 5C	Oregon: A Multivariate Analysis, W74-01430 5B	Theory, W74-01201 2E
Electrophoretic and Immunological Analyses of	COASTAL AREAS	
Seven Chlorosarcinacean Algae,	The Management of Bay and Estuarine	Long Surf, W74-01203 2E
W74-01426 5A	Systems in the Texas Coastal Zone, Phase II.	
Algal Succession on Artificial Reefs in a	W74-01620 5G	The Influence of Topography and Pressure
Marine Lagoon Environment in Guam,	COASTAL ENGINEERING	Gradients on Shoaling in a Tidal Estuary, W74-01204 2L
W74-01429 5C	South American Marine Energy,	11.1-01204
CHLORPYRIPHOS	W74-01181 8A	The Transverse Circulation Near a Coast,
Gas-Liquid Chromatographic Determination of Chlorpyriphos in Dursban Insecticide Formula-	COASTAL PLAINS Stratigraphy and Economic Geology of the	W74-01206 2E
tions, W74-01405 5A	Coastal Plain of the Central Savannah River Area, Georgia,	The Circulation of Surface Waters in Raleigh Bay, North Carolina,
CHROMIUM	W74-01122 2J	W74-01210 2L
Investigation of Spectral Overlap of the Neon	COASTAL ZONE MANAGEMENT	Sand Movement Along Equilibrium Beaches
359.352-nm and Chromium 359.349-nm Spectral Lines in Atomic Absorption and Atomic	The Management of Bay and Estuarine	North of San Francisco, W74-01213 2J
Fluorescence Spectrometry of Chromium, W74-01337 2K	Systems in the Texas Coastal Zone, Phase II. W74-01620 5G	Observations and Experiments on Solitary
11 T-01331	COASTS	Wave Deformation,
CHYTRIDIUM OTTARIENSIS Two New Chytrids from the Appalachian	The Breaking of Waves on a Sloping Beach,	W74-01215 8B
Highlands,	W74-01176 2E	Erosion of Tidal Flats Near Georgetown,
W74-01305 5A	Sedimentation in a Meandering Estuary, W74-01177 2L	British Guiana, W74-01216 2J
CIRCULATION		
Littoral Processes and the Development of	On Structure, Entrainment, and Transport in	Experimental Study of Wave Reflection by a
Shorelines, W74-01212 2J	Estuarine Embayments, W74-01178 2L	Sloping Beach, W74-01223 2E
		46

Observations of Net Shoreline Positions and	COLUMBIA RIVER	vod severo-zapadnogo sklona Bol'shogo Kav-
Approximations of Barrier Island Sediment	The Union of the Columbia River and the	kaza),
Budgets,	Pacific Ocean General Features,	W74-01136 4B
W74-01372 2L	W74-01183 2L	
		Problems in Regional Dynamics of Artesian
Oscillations of Tide and Surge in an Estuary of	Tidal Period Oscillations of an Isohaline Sur-	Water (Problemy regional'noy dinamiki artezi-
Finite Length,	face Off the Mouth of the Columbia River,	anskikh vod),
W74-01649 2L	W74-01188 2L	W74-01141 2F
	COMMINITE REVELOPMENT	CONNATE WATER
Longshore Current Generation by Obliquely In-	COMMUNITY DEVELOPMENT	Sand Beach Bacteria: Enumeration and
cident Internal Waves,	Arizona's Coming Dilemma: Water Supply and	Characterization,
W74-01650 2E	Population Growth,	W74-01444 5A
	W74-01452 4A	W 14-01444 3A
COBALT	COMPETITIVE PRICES	CONNECTICUT
Determination of Low Concentrations of	The Impact of Water Pollution Abatement on	Sierra Club v. Mason (Action to Enjoin
Cobalt in Plant Material by Atomic Absorption	Competition and Pricing in the Alabama Textile	Dredging of New Haven Harbor).
Spectrophotometry,	Industry,	W74-01456 6E
W74-01356 2K	W74-01101 5G	-
		CONSERVATION OF MASS
COBALT RADIOISOTOPES	COMPREHENSIVE PLANNING	Longshore Current Velocity: A Review of
Concentrations of Plutonium, Cobalt, and	Comprehensive Water and Sewer Plan, Ran-	Theory and Data,
Silver Radionuclides in Selected Pacific	dolph County, Illinois.	W74-01187 2E
Seaweeds,	W74-01474 5D	
W74-01297		CONTINUOUS FLOW SYSTEM
000000000000000000000000000000000000000	A Growing Community: 1973 Update, (Lexing-	Ion-Electrode Based Automatic Glucose Analy-
COCCOCHLORIS	ton, Kentucky).	sis System,
Loss of Photosynthetic Activity in Two Blue-	W74-01484 5D	W74-01513 5A
Green Algae as a Result of Osmotic Stress,		
W74-01302 5B	Physical System Modelling as a Tool in Water	COPEPOD
	Resource Planning,	Oxbow Cut-Off Bog Lake Zooplankton of the
COKE-OVEN EFFLUENTS	W74-01487 2A	Kolyma Basin (In Russian),
The Role of Micro-Organisms in Waste Tip-	COMPUTED MODELS	W74-01265 2H
Lagoon Systems Purifying Coke-Oven Ef-	COMPUTER MODELS	COPERODA
fluents,	Agricultural Water Demand in North Carolina:	COPEPODA
W74-01647 5D	Phases I and II,	Zooplankton in Kolyma-Indigirka Lakes (In
	W74-01112 6D	Russian),
COLD REGIONS	Sensitivity of Groundwater flow Models to	W74-01341 2H
Single-Velocity Method in Measuring		The Planktonic Association (Cladocera and
Discharge,	Vertical Variability of Aquifer Constants, W74-01151 4B	Copepoda) of a Dimictic Lake of the Lau-
W74-01161 2C		rentides Park, Quebec, (In French),
gar manu	Review of Planning for the Grand River	W74-01558 2H
COLIFORM	Watershed.	
Survival of Coliform Bacteria in Natural	W74-01478 5D	COPEPODS
Waters: Field and Laboratory Studies with		Revision of Family and Some Generic Defini-
Membrane-Filter Chambers,	COMPUTER PROGRAMS	tions in the Phaennidae and Scolecithricidae
W74-01250 5B	Computer Identification of Bacteria on the	(Copepoda: Calanoida),
	Basis of Their Antibiotic Susceptibility Pat-	W74-01308 5A
COLLEGE FIORD (ALAS)	terns,	
Seismic Evidence for Glacier Motion,	W74-01443 5A	A New Species of Boeckella (Copepoda: Cala
W74-01378 2C		noida) from Northland, New Zealand,
	Using Computers to Analyze Continuous Data,	W74-01309 5A
COLOMBIA (PASTO HIGHLANDS)	W74-01520 7C	
Physical Properties of Some Volcanic-Ash	Waterlands Washandar Make to the Water	COPPER
Derived Soils of the Highlands of Pasto,	Hydrologic Engineering Methods for Water	Biochemistry of Estuarine Ecosystem with
Narino, Colombia, (In Spanish),	Resources Development. Volume 2. Hydrologic	Emphasis on Heavy Metals and Shellfish,
W74-01228 2G	Data Management, W74-01642 2E	W74-01108 50
	W 74-01042 ZE	A Comparison of Fast Destruction Methods fo
COLORADO	COMPUTERS	the Determination of Trace Metals in Biologica
Hydrogeologic Characteristics of the Valley-	Evaluation of the Accuracy of Gran Plots by	
Fill Aquifer in the Weldona Reach of the South	Means of Computer Calculations. Application	Materials, W74-01317 54
Platte River Valley, Colorado,	to the Potentiometric Titration of the Total Al-	W 14-01311
W74-01142 4B	kalinity and Carbonate Content in Sea Water,	Concentrations of Dissolved Forms of Fe, Mn
Steem Decisions and Divid Control of	W74-01365 2K	and Cu in Marine Pore Waters of the Atlanti
Storm Drainage and Flood Control for		Basin (Kontsentratsii rastvorennykh form Fe
Metropolitan Denver.	Computer Identification of Yeasts of the Genus	Mn, i Cu v morskikh, porovykh vodakh bas
W74-01475 4A	Saccharomyces,	seyna Atlanticheskogo okeana),
COLODIMETRY	W74-01646 5A	W74-01392 21
COLORIMETRY		
Collaborative Study of a Colorimetric Method	CONFERENCES	Copper Micronutrient Requirement for Algae,
for Determining Arsenic Residues in Red Meat	Problems in Regional Dynamics of Artesian	W74-01398 50
and Poultry,	Water (Problemy regional'noy dinamiki artezi-	
W74-01403 5A	anskikh vod),	Ligand Photooxidation in Copper (II) Com
An Automated Mathad for the Dodge 'est'	W74-01141 2F	plexes of Nitrilotriacetic Acid. Implications fo
An Automated Method for the Dertemination		Natural Waters,
of Trace Amounts of Metal Ions by Ion-	CONFINED WATER	W74-01400 51
Exchange Chromatography. Determination of	Balance Estimate of Groundwater Resources	Y C-li C
zinc (II) in Waters,	on the Northwestern Slope of the Caucasus	Ion Selective Sensors,
W74-01438 5A	(Balansovaya otsenka resursov podzemnykh	W74-01506 5/

5A

COPPER

Particulate Metals in Waters of Sorfjord West	CRUSTACEAN ZOOPLANKTON	The Generation of Longshore Currents on a
Norway,	Production of Crustacean Zooplankton in Moty	Plane Beach,
W74-01528 5B	Bay, Lake Jeziorak: The method of Production Estimation.	W74-01208 2L
Swimming Endurance and Resistance to	W74-01172 2H	Currents at Toledo Harbor,
Copper and Malathion of Bluegills Treated by	Production of Courts are Zamalankton in Mate	W74-01214 2H
Long-Term Exposure to Sublethal Levels of	Production of Crustacean Zooplankton in Moty Bay, Lake Jeziorak: II. Estimation of Produc-	CYANIDIUM CALDARIUM
Hydrogen Sulfide, W74-01579 5C	tion of the Predominating Species,	Algal Excretion of C-14-Labeled Compounds
	W74-01173 2H	and Microbial Interactions in Cyanidium cal-
CORYNEBACTERIUM	CRUSTACEANS	darium Mats, W74-01510 5C
The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum,	The Distribution, Composition and Biomass of	30
W74-01422 5C	the Crustacean Zooplankton Population in	СУАНОРНУТА
	Western Lake Superior, W74-01109 5C	Chemical Relationships Between Surface Water and the Ground in South Florida,
CORYNEBACTERIUM	W74-01109 5C	W74-01153 2K
PSEUDODIPHTHERITICUM Degradative Versatility of Corynebacterium	CULICIDAE	To a Photograph of Addition in The Photograph
pseudodiphtheriticum NCIB 10803 which uses	Some Influences of Aquatic Vegetation on the	Loss of Photosynthetic Activity in Two Blue- Green Algae as a Result of Osmotic Stress,
Amides as Carbon Source,	Species and Number of Culicidae (Diptera) in Small Pools of Water,	W74-01302 5B
W74-01536 5B	W74-01609 2I	Allel Consenses on Addition Books in a
COST ANALYSIS	CUI TURE MEDIA	Algal Succession on Artificial Reefs in a Marine Lagoon Environment in Guam,
A Cost-Effectiveness Study and Analysis of	CULTURE MEDIA Microbial Culture Media Preparation,	W74-01429 5C
Municipal Refuse Disposal Systems,	W74-01505 5A	
W74-01631 5E		Growth and Buoyancy of Microcystis aeru- ginosa Kutz. Emend. Elenkin in a Shallow
COST MINIMIZATION	Silica Gel Medium for Enumeration of Petrole- umlytic Microorganisms in the Marine Environ-	Eutrophic Lake,
A Hybrid Model for Irrigation Planning Using	ment,	W74-01518 5C
Chance Constrained Programming and	W74-01532 5A	Hudashialariaal Studies on the Ladaiaka Dub
Hydrologic Simulation,	CHITHES	Hydrobiological Studies on the Lednicke Ryb- niky Ponds: Species Composition and Seasonal
W74-01488 4B	CULTURES Loss of Photosynthetic Activity in Two Blue-	Variation in the Abundance of Plankton (In
COTTON	Green Algae as a Result of Osmotic Stress,	Czech),
Water Requirements of Wheat and Cotton on a	W74-01302 5B	W74-01567 ŠC
High Water Table Soil Under Arid Conditions, W74-01595	Studies of Rapid NTA-Utilizing Bacterial Mu-	CYCLING NUTRIENTS
W 74-01373	tant,	Hydrologic Nutrient Cycle Interactions in
COULOSTATIC ANALYSIS	W74-01348 5B	Undisturbed and Manipulated Ecosystems
Double Pulse Coulostatics,	The Effects of Bacteria on the Growth and	(Watersheds), W74-01110 4C
W74-01511 2K	Reproduction of Oedogonium Cardiacum,	
CREOSOTEBUSH	W74-01422 5C	Effects of Protozoa on the Fate of Particulate Carbon,
Brush Eradicating, Basin Pitting, and Seeding	Some Thoughts on Nutrient Limitation in Al-	W74-01117 5C
Machine for Arid to Semiarid Rangeland,	gae,	
W74-01637 4A	W74-01428 5C	CYMBELLA CAESPITOSA Diatom Flora of the Grand River, Ontario,
CRETACEOUS SANDSTONES	Sand Beach Bacteria: Enumeration and	Canada,
Calculation of Permeability of Cretaceous	Characterization,	W74-01311 5A
Sandstones from Pumping and Static Level	W74-01444 5A	CYTOLOGICAL STUDIES
Data in Selected Areas of Western South Dakota,	The Sensitivity of Suppressed and Unsup-	Indirect Coulometric Titration of Biological
W74-01113 2F	pressed Lon Strains of Escherichia coli to	Electron Transport Components,
CRICEICUR A CRE	Chemical Agents with Induce Filamentation,	W74-01338 2K
CRISTIGERA SPP Growth Rates of Sediment-Living Marine	W74-01524 5C	Sublittoral Benthic Marine Algae of Southern
Protozoan as a Toxicity Indicator for Heavy	Fisheries and Fish Culture in Israel in 1971,	Cape Cod and Adjacent Islands: Pseu-
Metals,	W74-01570 6B	dolithoderma Paradoxum Sp. Nov. (Ralf-
W74-01529 5A	Relationships of Indicator and Pathogenic Bac-	siaceae, Ectocarpales), W74-01350 5A
CROP ROTATION	teria in Stream Waters,	
Crop Rotation Schemes for Optimal Utilization	W74-01645 5B	Salinity Adaptation by Dunaliella Tertiolecta. I.
of Agricultural Land,	CULTURING VESSELS	Increases in Carbonic Anhydrase Activity and Evidence for a Light-Dependent Na (Plus)/H
W74-01596 3F	Pankhurst Tubes Modified to Indicate	(Plus) Exchange,
CROP YIELD	Anaerobiosis,	W74-01427 5C
Diurnal Changes in Transpiration and Daily	W74-01545 5A	Bacteriology of Activated Sludge, in Particular
Photosynthetic Rater of Several Crop Plants, W74-01597 2D	CURRENTS (WATER)	the Filamentous Bacteria,
W74-01597 2D	Longshore Current Velocity: A Review of	W74-01540 5B
Effect of Moisture Stress on Soybean (Glycine	Theory and Data, W74-01187 2E	Rhodopseudomonas Sulfidophila, Nov. Spec.,
max (L.) Merr.), W74-01599 3F		A New Species of the Purple Nonsulfur Bac-
W74-01599 3F	Shifting Offshore Bars and Harbor Shoaling, W74-01191 2J	teria, W74-01544 5B
CRUDE OIL	7,4-01171	
Inhibition by Fatty Acids of the Biodegradation	On the Vertical Structure of Tidal Flow in	CZECHOSLOVAKIA (DANUBE RIVER)
of Petroleum, W74-01537 5B	River Estuaries, W74-01205 2L	Phytoplankton of the Czechoslovak Sector of the Danube and of the Estuaries of the Prin-

DELAWARE RIVER BASIN COMMISSION

cipal Tributaries on Czechoslovak Territory, (In Czect.), W74-01371 2I	DATA INTERPRETATION Evaluation of the Accuracy of Gran Plots by Means of Computer Calculations. Application	The Effect of Aldrin on Water Balance in the Freshwater Pulmonate Gastropod (Biomphalaria glabrata),
	to the Potentiometric Titration of the Total Al-	W74-01525 5C
CZECHOSLOVAKIA (LEDNICKE-RYBNIKY PONDS)	kalinity and Carbonate Content in Sea Water, W74-01365 2K	DECHLOROGRISEOFULVIN
Hydrobiological Studies on the Lednicke Ryb-		Determination of Griscofulvin by Time-
niky Ponds: Species Composition and Seasonal Variation in the Abundance of Plankton (In	DATA PROCESSING Symposium on Significant Results Obtained	Resolved Phosphorimetry, W74-01224 5A
Czech),	from Earth Resources Technology Satellite-1,	RECICION MARINO
W74-01567 5C	March 5-9, 1973: Volume III-Discipline Sum- mary Reports.	DECISION MAKING Simulation of Water Recreation Users' Deci-
DARTERS	W74-01163 7C	sions,
Dieldrin. Effects of Chronic Sublethal Expo- sure on Adaptation to Thermal Stress in Fresh-	Interpretation Techniques Development,	W74-01464 6D
water Fish,	W74-01170 7B	DEEP-WATER HABITATS New Records of Sargassum Hawaiiensis Doty
W74-01408 5C	Processing and Storage of Hydrometeorological	and Newhouse (Sargassaceae, Phaeophyta), a
DATA ACQUISITION	Data in the Atmospheric Environment Service, W74-01290 7C	Deep Water Species,
Novel Method of Raman Data Acquisition, W74-01330 2K		W74-01349 2I
Using Computers to Analyze Continuous Data,	Storage and Retrieval of Groundwater Data, W74-01291 7C	DEFLUORIDATION PLANT
W74-01520 7C	Association Stance and Brassocian of Chairs	Effect of Partial Defluoridation of a Water Supply on Dental Fluorosis: Final Results in
DATA COLLECTIONS	Acquisition, Storage and Processing of Glacier Inventory Data,	Bartlett, Texas, After 17 Years,
DATA COLLECTIONS Near Real Time Water Resources Data for	W74-01292 7C	W74-01578 5F
River Basin Management,	Storage and Processing of Water Quality Data,	DEGRADATION (DECOMPOSITION)
W74-01150 4A	W74-01293 7C	Ethylenethiourea Degradation, W74-01340 SB
Utilization of Remote Sensing in River Basin	Computer Utilization of Hydrological Data for	W74-01340 5B
Studies, W74-01154 5A	North Nashwaaksis Representative Basin, W74-01294 7C	Chlorinated Hydrocarbon Insecticides in Sedi-
		ments of Southern Lake Michigan, W74-01397 5B
Arctic Data Buoys and Aidjex, W74-01156 7B	Data Acquisition and Storage for Research Watersheds,	DEGRADATION PRODUCTS
	W74-01295 7C	Thermal and Base-Catalyzed Hydrolysis
The Soviet Darms ProgramTwenty Years of Development, Deployment, and Data.	Planned Data Storage Methods for the Interna-	Products of the Systemic Fungicide, Benomyl,
W74-01157 7C	tional Field Year for the Great Lakes,	W74-01504 5B
The Arctic Data Buoy, A System for Environ-	W74-01296 7C	DELAWARE
mental Monitoring in the Arctic, W74-01158 7B	Using Computers to Analyze Continuous Data, W74-01520 7C	Prediction of Well Development Possibilities in Delaware by means of Calibrated Gamma-Ray Logs,
Barometric Pressure Measurements from	Hydrologic Engineering Methods for Water	W74-01106 4B
Buoys During AIDJEX 1972, W74-01159 7B	Resources Development. Volume 2. Hydrologic Data Management,	Mercury in the Environment-A Global Review
	W74-01642 2E	Including Recent Studies in the Delaware Bay Region,
A Resonant Capsule Pressure Transducer For Data Buoys,	DATA STORAGE AND RETIEVAL	W74-01373 5B
W74-01160 7B	Storage and Retrieval of Groundwater Data,	DELAWARE BAY
Symposium on Significant Results Obtained	W74-01291 7C	Effect of Spoil Disposal on Benthic Inver-
from Earth Resources Technology Satellite-1,	DATA STORAGE AND RETRIEVAL Processing and Storage of Hydrometeorological	tebrates, W74-01420 5C
March 5-9, 1973: Volume IIIDiscipline Sum- mary Reports.	Data in the Atmospheric Environment Service,	W/4-01420
W74-01163 7C	W74-01290 7C	DELAWARE BAY AREA Inventory and Evaluation of Information on
Processing and Storage of Hydrometeorological	Acquisition, Storage and Processing of Glacier	Delaware Bay, Volume 2.
Data in the Atmospheric Environment Service,	Inventory Data, W74-01292 7C	W74-01369 6E
W74-01290 7C		DELAWARE BAY REGION
Acquisition, Storage and Processing of Glacier Inventory Data,	Storage and Processing of Water Quality Data, W74-01293 7C	Mercury in the EnvironmentA Global Review Including Recent Studies in the Delaware Bay
W74-01292 7C	Data Acquisition and Storage for Research	Region, W74-01373 5B
Availability of Fresh Water in the East Central	Watersheds, W74-01295 7C	DELAWARE RIVER
Florida Planning Region. W74-01481 6D	Planned Data Storage Methods for the Interna-	Near Real Time Water Resources Data for
Hydrological Information for the Planning of	tional Field Year for the Great Lakes,	River Basin Management,
	W74-01296 7C	W74-01150 4A
Water Resources in Developing Countries (L-		Investory and Evaluation of Information on
'Information Hydrologique Pour La Planifica-	DDT	
	DDT Chlorinated Hydrocarbon Insecticides in Sediments of Southern Lake Michigan,	Inventory and Evaluation of Information on Delaware Bay, Volume 2. W74-01369 6E
'Information Hydrologique Pour La Planifica- tion des Resources Hydrauliques Dans Les	Chlorinated Hydrocarbon Insecticides in Sedi-	Delaware Bay, Volume 2. W74-01369 6E
'Information Hydrologique Pour La Planifica- tion des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C DATA DISPLAYS	Chlorinated Hydrocarbon Insecticides in Sedi- ments of Southern Lake Michigan,	Delaware Bay, Volume 2.
'Information Hydrologique Pour La Planifica- tion des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C	Chlorinated Hydrocarbon Insecticides in Sediments of Southern Lake Michigan, W74-01397 5B	Delaware Bay, Volume 2. W74-01369 6E DELAWARE RIVER BASIN COMMISSION

DELTAS

DELTAS	The Ecology of the Diatoms of the Klip River,	DISCRIMINANT ANALYSIS
Computer Simulation of Estuarial Networks,	Southern Transvaal,	Objective Regionalization of Peak Flow Rates,
W74-01197 2L	W74-01313 5C	W74-01174 4D
DENVER (COLO)	Diatom Associations in Yaquina Estuary,	DISCRIMINATION NETS
Storm Drainage and Flood Control for	Oregon : A Multivariate Analysis,	Simulation of Water Recreation Users' Deci-
Metropolitan Denver.	W74-01430 5B	sions,
W74-01475 4A		W74-01464 6D
	Kinetics of Silicon-Limited Growth in the	DISPERSION
DEPOSITION (SEDIMENTS)	Marine Diatom Thalassiosira pseudonana Hasle	A Study of Tidal Dispersion in the Potomac
A Method of Forecasting the Building of a	and Heimdal (Equals Cyclotella Nana Hustedt), W74-01431 5C	River,
River Bar (Metod prognoza pereformirovaniy	W 74-01431	W74-01196 5B
rechnogo bara), W74-01388 2J	DIEBACK (FORESTS)	
W /4-01386	Die-Back in the Mixed Hardwood Forests of	DISSOLVED SOLIDS
DESERTS	Eastern Victoria: A Preliminary Report,	A Study of the Exchange of Dissolved Solids
Distribution Patterns and Population Dyanmics	W74-01251 4A	Between Bottom Sediments and Water of Dif-
of the Micro-Arthropods of a Desert Soil in	DIELDRIN	ferent Water Bodies (Izucheniye obmena rast-
Southern California,	Dieldrin. Effects of Chronic Sublethal Expo-	vorennymi veshchestvami mezhdu donnymi ot-
W74-01635 2I	sure on Adaptation to Thermal Stress in Fresh-	lozheniyami i vodoy razlichnykh vodoyemov), W74-01389 2J
DESIGN CRITERIA	water Fish,	177-01307
	W74-01408 5C	Concentrations of Dissolved Forms of Fe, Mn,
Rotameter. W74-01500 7B		and Cu in Marine Pore Waters of the Atlantic
W74-01500 7B	Determination of Chlorinated Pesticides in	Basin (Kontsentratsii rastvorennykh form Fe,
Guide to Selecting Graphic Displays,	Whole Blood,	Mn, i Cu v morskikh, porovykh vodakh bas-
W74-01519 7B	W74-01417 5A	seyna Atlanticheskogo okeana),
	DIFFERENCE THERMAL CONDUCTIVITY	W74-01392 2K
Choosing a Static Inverter System,	Nitrogen/Argon Ratios by Difference Thermal	A Mathematical Model of Primary Productivity
W74-01547 7B	Conductivity,	and Limnological Patterns in Lake Mead,
	W74-01522 5A	W74-01630 5C
DETERGENTS	77-71385	
A Procedure for the Estimation of Microgram	DIFFUSION	DISTILLATION
Quantities of Triton X-100, W74-01360 5A	On the Small-Scale Horizontal Diffusion Near	Improved Distillation Method for Volatile
W74-01360 5A	the Coast,	Acids Analysis,
DETRITUS	W74-01186 5B	W74-01322 5A
An Automatic Separator for the Removal of	Experiments and Hydrographic Surveys Off	DISTRIBUTION PATTERNS
Aquatic Insects from Detritus,	Sandy Hook, New Jersey (1963),	Chlorinated Hydrocarbon Insecticides in Sedi-
W74-01624 7B	W74-01199 2L	ments of Southern Lake Michigan,
	1174-01177	W74-01397 5B
DEUTERIM	The Equations of Continuity for Seawater and	
Isotopic Composition of Oxygen and Hydrogen	River Water in Estuaries,	Probable Causes for the 1972 Red Tide in the
in Sulfide Waters of the Sochi-Adler Artesian	W74-01207 2L	Cape Ann Region of the Gulf of Maine, W74-01435 5C
Basin (Izotopnyy sostav kisloroda i vodorada	Petropies Circulation Induced by Diffusion	W74-01435 5C
sul'fidnykh vod Sochi-Adlerskogo artezian-	Estuarine Circulation Induced by Diffusion, W74-01222 2L	Particulate Metals in Waters of Sorfjord West
skogo basseyna), W74-01394 2K	W/4-01222 2L	Norway,
W74-01394 2K	DIFFUSION RESISTANCE	W74-01528 5B
DEVELOPING COUNTRIES (WEST AFRICA)	Leaf Temperatures, Diffusion Resistances, and	D' - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
Hydrological Information for the Planning of	Transpiration,	Distribution of (C-14) PCBs in Carp, W74-01530 5C
Water Resources in Developing Countries (L-	W74-01254 2D	W74-01530 5C
'Information Hydrologique Pour La Planifica-	PIGEORIAN	Distribution Patterns and Population Dyanmics
tion des Resources Hydrauliques Dans Les	DIGESTION	of the Micro-Arthropods of a Desert Soil in
Pays en Voie de Developpement),	Nutrient Removal Using Lemna Minor, W74-01321 5C	Southern California,
W74-01623 7C	W/4-01321	W74-01635 2I
	DIGITAL TO ANALOG CONVERTERS	
DEVELOPING NATIONS	Don't Forget D/A Converter Tempco,	DIURNAL CHANGES
River Basin Planning in the United States,	W74-01507 7C	Diurnal Changes in Transpiration and Daily Photosynthetic Rater of Several Crop Plants,
W74-01472 6B		W74-01597 2D
DIAPTOMIDS	DIMETHYLARSINE	20
Notes on the Dynamics of the Reproductive	Distribution of Alkyl Arsenicals in Model	DOMAIN MEANS
Activity of Arctodiaptomus Bacillifer in High	Ecosystem, W74-01409 5C	Estimation of Domain Means Using Two-Phase
Altitude Alpine Lakes,	W/4-01409	Sampling,
W74-01209 2H	DIMICTIC LAKE	W74-01498 7B
	The Planktonic Association (Cladocera and	DOMESTIC WASTES
DIAPTOMUS PALLIDUS	Copepoda) of a Dimictic Lake of the Lau-	Pressurized Sewer Collection Systems,
Population Dynamics of Pond Zooplankton, I.	rentides Park, Quebec, (In French),	W74-01286 5D
Diaptomus pallidus Herrick,	W74-01558 2H	
W74-01502 5C	DINOFLAGELLATES	DOUBLE PULSE COULOSTATICS
DIATOMS	Probable Causes for the 1972 Red Tide in the	Double Pulse Coulostatics,
Diatoms of the Upper Course of the Stream	Cape Ann Region of the Gulf of Maine,	W74-01511 2K
Sanka (Cracow-Czestochowa Upland), (In	W74-01435 5C	DRAWDOWN
Polish),		Sensitivity of Groundwater flow Models to
W74-01258 2I	DIPTERA	Vertical Variability of Aquifer Constants,
Distant Plant of the Co. 1 Di	Some Influences of Aquatic Vegetation on the	W74-01151 4B
Diatom Flora of the Grand River, Ontario, Canada.	Species and Number of Culicidae (Diptera) in Small Pools of Water.	Decordance of Time Decord of Time
W74_01311	Small Pools of Water,	Drawdown at Time-Dependent Flowrate,

Numerical Solution of Multiphase Well Flow, W74-01275 8B	Acridine Orange-Epifluorescence Technique for Counting Bacteria in Natural Waters,	ELECTRIC POWER Concept-Scale Interaction with the Semantic
DREDGING	W74-01534 5A	Differential Technique,
Effect of Spoil Disposal on Benthic Inver-	ECOLOGICAL IMPACT	W74-01644 6B
tebrates, W74-01420 5C	Ecological Impact of Pesticides, W74-01573 5C	ELECTRICAL CONDUCTIVITY Effect of the Quality of Well Waters on Soils in
Sierra Club v. Mason (Action to Enjoin	ECOLOGY	Gurgaon District, W74-01252 2G
Dredging of New Haven Harbor).	The Ecology of the Diatoms of the Klip River,	
W74-01456 6E	Southern Transvaal, W74-01313 5C	ELECTRICAL PROPERTIES Glass-Metal Composite Electrodes,
DROPSY	W/4-01313	W74-01512 2K
Increase of Resistance of Carp to Dropsy by Means of Breeding. II. Course of Selection and	Observations on the Ecology of Laminaria Sin-	ELECTROCHEMICAL CELLS
Evaluation of the Breed Groups, (In Russian), W74-01560 5C	clairii on Three Northern Oregon Beaches, W74-01423 5C	Small-Volume Solid-Electrode Flow-Through Electrochemical Cells. Preliminary Evaluation
DROUGHT TOLERANCE	Freshwater Mussel Ecology, Kentucky Lake,	Using Pulse Polarographic Techniques, W74-01445 7B
Water Use by Perennial Evergreen Plant Com-	Tennessee, May 1, 1969-June 15, 1972, W74-01641 5C	
munities in Australia and Papua New Guinea,		ELECTROCHEMISTRY Semiintegral Electroanalysis: Shapes of
W74-01634 2D	Relationship of Pumping Lift to Economic Use	Neopolarograms,
DUGESIA TIGRINA	of Groundwater for Irrigation,	W74-01333 5A
Evaluation of the Response of Dugesia Tigrina to Aflatoxin B1,	W74-01120 4B	Anion Responses and Potential Functions for
W74-01404 5C	On the Optimal Operation of Groundwater	Neutral Carrier Membrane Electrodes,
DUNALIELLA TERTIOLECTA	Basins: A Calculus of Variations Approach,	W74-01334 2K
Salinity Adaptation by Dunaliella Tertiolecta. I.	W74-01489 4B	Indirect Coulometric Titration of Biological
Increases in Carbonic Anhydrase Activity and Evidence for a Light-Dependent Na (Plus)/H	Economics of Resource Use on Sample Farms of Central Gujarat,	Electron Transport Components, W74-01338 2K
(Plus) Exchange,	W74-01491 3F	ELECTRODES
W74-01427 5C	ECONOMIC IMPACT	Semiintegral Electroanalysis: Shapes of
DURSBAN	The Impact of Water Pollution Abatement on	Neopolarograms, W74-01333 5A
Gas-Liquid Chromatographic Determination of Chlorpyriphos in Dursban Insecticide Formula-	Competition and Pricing in the Alabama Textile	
tions,	Industry, W74-01101 5G	Anion Responses and Potential Functions for Neutral Carrier Membrane Electrodes,
W74-01405 5A		W74-01334 2K
DYE CONCENTRATIONS	Impact of Irrigation Investments on Regional and Urban Development,	The Potentiometric Titration of Potassium in
Experiments and Hydrographic Surveys Off	W74-01625 6B	Sea Water with a Valinomycin Electrode,
Sandy Hook, New Jersey (1963), W74-01199 2L	ECONOMICS	W74-01442 5A
	Stratigraphy and Economic Geology of the	Ion Selective Sensors,
DYSTROPHY Batrachospermum Vagum Ag. in the Szczecin	Coastal Plain of the Central Savannah River	W74-01506 5A
Pomerania, A Locality New to Poland, (In	Area, Georgia, W74-01122 2J	Glass-Metal Composite Electrodes,
Polish),		W74-01512 2K
W74-01219 2H	Valuation of Visual-Cultural Benefits from Freshwater Wetlands in Massachusetts,	Ion-Electrode Based Automatic Glucose Analy-
E. COLI	W74-01643 6B	sis System,
The Sensitivity of Suppressed and Unsup- pressed Lon Strains of Escherichia coli to	EDAPHOLOGY	W74-01513 5A
Chemical Agents with Induce Filamentation, W74-01524 5C	Physical Edaphology. The Physics of Irrigated and Nonirrigated Soils,	Analytical Applications of Pulsed Voltammetric Stripping at Thin Film Mercury Electrodes,
	W74-01572 2G	W74-01514 5A
Sensitivity of Three Selected Bacterial Species to Ozone.	EDGE WAVES	ELECTROLYTES
W74-01553 5F	A Note on Edge Waves in a Stratified Fluid,	Anion Responses and Potential Functions for
Comparison of Gelman and Millipore Mem-	W74-01194 2E	Neutral Carrier Membrane Electrodes, W74-01334 2K
brane Filters for Enumerating Fecal Coliform	EDUCATION	
Bacteria, W74-01554 5A	Graduate Courses Related to Water Resources. W74-01119 9A	ELECTRON CAPTURE GAS CHROMATOGRAPHY Analytical Methodology for Bioactive Com-
EARTH MATERIALS		pounds. Photochemically Assisted Analysis of
Engineering Characteristics of Overburden in	Educational Programs for Land and Water Resources Development and Management,	Chlorinated Hydrocarbon Pesticides in the
Knox County, Tennessee, W74-01143 7C	W74-01628 6B	Presence of Polychlorinated Biphenyls, W74-01493 5A
Overhunden Related to Tune of Bedrock and	ELBE ESTUARY (GERMANY)	
Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock,	Investigations on the Influence of Tides on	Indirect Coulometric Titration of Biologica
Knox County, Tennessee,	Salinity, Content of Suspended Matter, Sedi- mentation and Bacteria Counts in the Elbe	Electron Transport Components,
W74-01144 7C	Estuary, (Untersuchungen Uber Die Einwir-	W74-01338 2K
ECOLOGICAL DISTRIBUTION	kung Der Tide Auf Salzgehalt, Schwebstoff-	ELECTROPHORESIS
Stream Community Response to Nutrient En- richment,	gehalt, Sedimentation Und Bakteriengehalt in Der unterelbe).	Electrophoretic and Immunological Analyses of Seven Chlorosarcinacean Algae,
W74-01499 5C	W74-01175 2L	W74-01426 5A

ELEMENTS

ELEMENTS The Effect of Substrate Humidity on the Supply of Macroelements to Plants, (In Latvi-	City of Monmouth V. Environmental Protec- tion Agency (EPA Sued the City to Prohibit the City from Continuing to Maintain a Sewage	ERODED SOIL Productivity of Cereal Crops on Eroded Chernozems Against Both Non-Fertilized and Fertil-
an), W74-01241 3F	Lagoon System Which was Emitting Noxious Odors).	ized Backgrounds, (In Russian), W74-01557 3F
PL SACING PROPE	W74-01462 6E	EROSION
ELIMINATION Metabolism and Biliary Excretion of Sul-	Promoting Environmental Quality Through	Erosion of Tidal Flats Near Georgetown,
fobromophthalein by Rainbow Trout (Salmo	Urban Planning and Controls,	British Guiana,
Gairdneri),	W74-01470 5D	W74-01216 2J
W74-01411 5C		
EMISSION SPECTOSCOPY	Microfauna of Activated Sludge. Part III. The Effect of Physico-Chemical Factors on the Oc-	ERROR Some Sources of Error in the 14C Method for
Emission Spectrometric Determination of	currence of Microfauna in the Annual Cycle,	Estimating Primary Productivity and Their
Trace Metals in Biological Tissues,	W74-01542 5C	Relationship to Light Intensity During Incuba-
W74-01546 5A		tion,
	Ecological Impact of Pesticides,	W74-01217 2H
A Profile of the Four Moment Measures Per-	W74-01573 5C	ERRORS
pendicular to a Shore Line, South Haven,	Tallahala Creek Lake, Pascagoula River Basin.	Extended Tables for Kendall's Tau,
Michigan,	Mississippi (Final Environmental Impact State-	W74-01497 7C
W74-01184 2H	ment).	
	W74-01610 4A	Don't Forget D/A Converter Tempco,
ENERGY TRANSFER	Tallulah Creek Watershed (Long Creed Por-	W74-01507 7C
Indirect Coulometric Titration of Biological Electron Transport Components,	tion) Graham County, North Carolina (Final	ERTS
W74-01338 2K	Environmental Impact Statement).	Symposium on Significant Results Obtained
	W74-01621 4D	from Earth Resources Technology Satellite-1,
ENGINEERING STRUCTURES	ENVIRONMENTAL IMPACT STATEMENT	March 5-9, 1973: Volume IIIDiscipline Sum-
South American Marine Energy, W74-01181 8A	Tallulah Creek Watershed (Long Creed Por-	mary Reports. W74-01163 7C
W74-01181 8A	tion) Graham County, North Carolina (Final	W 74-01103
ENGLAND (RIVER CAMEL)	Environmental Impact Statement).	Agriculture, Forestry, Range Resources,
The Effect of Sand Deposition Upon the	W74-01621 4D	W74-01164 3F
Macro-Invertebrate Fauna of the River Camel,	ENVIRONMENTAL IMPACT STATEMENTS	Land Use and Mapping,
Cornwall,	Tallahala Creek Lake, Pascagoula River Basin.	W74-01165 4A
W74-01244 2I	Mississippi (Final Environmental Impact State-	
ENTERIC BACTERIA	ment).	Mineral Resources, Geological Structure and
Computer Identification of Bacteria on the	W74-01610 4A	Landform Surveys, W74-01166 7C
Basis of Their Antibiotic Susceptibility Pat-	ENVIRONMENTAL QUALITY	W /4-01100 /C
terns, W74-01443 5A	Physical System Modelling as a Tool in Water	Environment Surveys,
W74-01443 5A	Resource Planning,	W74-01167 5A
Microbial Flora and Level of Vibrio	W74-01487 2A	Water Resources,
Parahaemolyticus of Oysters (Crassostrea Vir-	ENVIRONMENTAL CANUTATION	W74-01168 7C
ginica), Water and Sediment from Galveston	ENVIRONMENTAL SANITATION Improved Waste Disposal Unit,	
Bay, W74-01548 5C	W74-01284 5D	Marine Resources and Ocean Surveys,
W/4-01340		W74-01169 7B
Comparison of Gelman and Millipore Mem-	ENZYMES	Interpretation Techniques Development,
brane Filters for Enumerating Fecal Coliform	Biochemistry of Estuarine Ecosystem with	W74-01170 7B
Bacteria,	Emphasis on Heavy Metals and Shellfish, W74-01108 5C	Market Market Market Day Co.
W74-01554 5A	W/4-01100	Multidisciplinary/Regional Resource Surveys, W74-01171 7B
ENTEROCOCCI	Salinity Adaptation by Dunaliella Tertiolecta. I.	W/4-011/1
Litmus Milk Reaction as a Distinguishing Fea-	Increases in Carbonic Anhydrase Activity and	ESTERS
ture Between Streptococcus Faecalis of Human	Evidence for a Light-Dependent Na (Plus)/H (Plus) Exchange,	Herbicide Analysis: Relationship Between
and Non-Human Origins, W74-01549 5A	W74-01427 5C	Molecular Structure and Retention Index, W74-01416 5A
W/1101547		W/4-01410
ENUMERATION	EPHEMEROPTERA	ESTIMATING
Silica Gel Medium for Enumeration of Petrole-	Number and Size of Drifting Nymphs of	Regional Estimate of Brackish- and Saline-
umlytic Microorganisms in the Marine Environ- ment,	Ephemeroptera, Chironomidae, and Simulidae by Day and Night in the River Stranda,	Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i
W74-01532 5A	Western Norway,	solenykh podzemnykh vod),
	W74-01230 2I	W74-01137 4B
Comparison of Gelman and Millipore Mem-	Assessment of Two Mark Since for Internal	
brane Filters for Enumerating Fecal Coliform Bacteria,	Assessment of Two Mesh Sizes for Interpreting Life Cycles, Standing Crop, and Percentage	A Procedure for the Estimation of Microgram Quantities of Triton X-100.
W74-01554 5A	Composition of Stream Insects,	W74-01360 5A
	W74-01601 2I	JA
ENVIRONMENTAL EFFECTS	POUR INDUIA	Estimation of Domain Means Using Two-Phase
In Re Spring Valley Development (Challenge to Order of Environmental Improvement Commis-	EQUILIBRIUM The Equilibrium Beach,	Sampling, W74-01498 7B
sion Denying Development Along Side of	W74-01195 2J	W74-01498 7B
Pond).		ESTUARIES

EQUIPMENT

QUIPMENT
Small-Volume Solid-Electrode Flow-Through
Electrochemical Cells. Preliminary Evaluation
Using Pulse Polarographic Techniques,
W74-01445
7B

6E

Investigations on the Influence of Tides on Salinity, Content of Suspended Matter, Sedimentation and Bacteria Counts in the Elbe Estuary, (Untersuchungen Uber Die Einwirkung Der Tide Auf Salzgehalt, Schwebstoff-

SU-16

Pond).

W74-01454

Sierra Club v. Mason (Action to Enjoin Dredging of New Haven Harbor). W74-01456 6E

gehalt, Sedimentation Und Bakteriengehalt in Der unterelbe),	EUTROPHICATION Recreational Reuse of Municipal Wastewater,	FECAL STREPTOCOCCI Relationships of Indicator and Pathogenic Bac-
W74-01175 2L	W74-01103 5D	teria in Stream Waters, W74-01645 5B
Sedimentation in a Meandering Estuary, W74-01177 2L	Growth and Buoyancy of Microcystis aeru- ginosa Kutz. Emend. Elenkin in a Shallow	FEDERAL GOVERNMENT
On Structure, Entrainment, and Transport in	Eutrophic Lake, W74-01518 5C	A Bill to Aid the Conservation of Natural Water Resources.
Estuarine Embayments, W74-01178 2L	EVALUATION	W74-01616 6E
The Union of the Columbia River and the	Evaluation of the Accuracy of Gran Plots by Means of Computer Calculations. Application	FERTILIZATION Role of Silt in Microcystis Aeruginosa
Pacific Ocean General Features, W74-01183 2L	to the Potentiometric Titration of the Total Al- kalinity and Carbonate Content in Sea Water.	Development, (In Russian), W74-01368 5C
Sediment Transport in a Coastal Plain Estuary,	W74-01365 2K	The Action of Mineral Fertilization on Pasture
W74-01185 2L	EVAPOTRANSPIRATION	Herbage, Irrigated with Sewage, (In Russian),
Tidal Period Oscillations of an Isohaline Surface Off the Mouth of the Columbia River,	Soil Salinization Under Irrigated Cultivation, W74-01238 3F	W74-01559 5D FERTILIZED CROPS
W74-01188 2L	EVAPOTRANSPIRATION CONTROL	Nitrates in Soil and Ground Water Beneath Ir-
A Study of Tidal Dispersion in the Potomac	Potential Usefulness of Antitranspirants for	rigated and Fertilized Crops,
River,	Solution of Some Water Supply, Plant Growth, and Environmental Problems,	W74-01245 3F
W74-01196 5B	W74-01105 3B	FERTILIZERS Experimental Establishment of Forest Planta-
Computer Simulation of Estuarial Networks, W74-01197 2L	EVERGREENS (PERENNIAL)	tions on Sands, in Accordance with the Idea of
	Water Use by Perennial Evergreen Plant Com-	G. N. Vysotskii (In Russian), W74-01569 2I
Harbor Analog System, Part I - Waves, W74-01200 2L	munities in Australia and Papua New Guinea, W74-01634 2D	
		FIBERS (PLANT) Fate of Lignin in Kraft Effluent Treatment,
The Influence of Topography and Pressure Gradients on Shoaling in a Tidal Estuary,	FABRICATION Glass-Metal Composite Electrodes,	W74-01320 5B
W74-01204 2L	W74-01512 2K	FILAMENTOUS ALGAE
On the Vertical Structure of Tidal Flow in	FATE OF POLLUTANTS	An Improved Method of Cell Enumeration for
River Estuaries, W74-01205 2L	Fate of Lignin in Kraft Effluent Treatment,	Filamentous Algae and Bacteria, W74-01421 5A
	W74-01320 5B	FILAMENTOUS BACTERIA
The Equations of Continuity for Seawater and River Water in Estuaries,	Ethylenethiourea Degradation, W74-01340 5B	An Improved Method of Cell Enumeration for
W74-01207 2L		Filamentous Algae and Bacteria, W74-01421 5A
Estuarine Circulation Induced by Diffusion,	Ligand Photooxidation in Copper (II) Com- plexes of Nitrilotriacetic Acid. Implications for	
W74-01222 2L	Natural Waters,	Bacteriology of Activated Sludge, in Particular the Filamentous Bacteria,
Ocean Utilization and Coastal Zone Develop-	W74-01400 5B	W74-01540 5B
ment. W74-01281 2L	Biodegradation of Phenylmercuric Acetate by	FILTRATION
Some Consequences of an Inertia of Turbu-	Mercury-Resistant Bacteria, W74-01555 5B	A Modified Filtration Method for the Analysis
lence in a Tidal Estuary,	FATTY ACIDS	of Wastewater Suspended Solids, W74-01318 5A
W74-01648 2L	Inhibition by Fatty Acids of the Biodegradation	Modifications in Filtration Methods for the
Oscillations of Tide and Surge in an Estuary of	of Petroleum, W74-01537 5B	Measurement of Inorganic C-14 Uptake by
Finite Length, W74-01649 2L		Photosynthesizing Algae, W74-01425 5A
	FAUNA Limnology and Fishery Biology of Black Lake,	
ESTUARINE ENVIRONMENT The Management of Bay and Estuarine	Northern Saskatchewan,	Some Effects of Filtration on the Determina- tion of Nutrients in Fresh and Salt Water,
Systems in the Texas Coastal Zone, Phase II.	W74-01234 2H	W74-01521 7B
W74-01620 5G	FAUNA (INVERTEBRATES)	Virus Concentration from Sewage,
ETHYLENETHIOUREA Ethylenethiourea Degradation,	The Effect of Sand Deposition Upon the Macro-Invertebrate Fauna of the River Camel,	W74-01533 5D
W74-01340 5B	Cornwall,	FINITE ELEMENT ANALYSIS
BUCALYPTUS	W74-01244 2I	Transient Movement of Water and Solutes in Unsaturated Soil Systems,
Die-Back in the Mixed Hardwood Forests of	FECAL COLIFORMS	W74-01104 2G
Eastern Victoria: A Preliminary Report, W74-01251 4A	Some Observations on Bacterial Populations in Wilgreen Lake, Madison, KY.,	FINLAND (LAKE KONNEVESI)
	W74-01242 5B	The Bottom Macrofauna of the Oligotrophic
EUGENE-SPRINGFIELD (ORE) Water Master Plan. Eugene-Springfield Ur-	Comparison of Gelman and Millipore Mem-	Lake Konnevesi, Finland, W74-01287 5C
banizing Area.	brane Filters for Enumerating Fecal Coliform	FISH
W74-01479 3D	Bacteria, W74-01554 5A	Separation and Identification of Carbofuran,
EUGLENA-RUBRA A First Record of Red-Water Phenomenon in	Relationships of Indicator and Pathogenic Bac-	Its Metabolites, and Conjugates Found in Fish
Kashmir, India,	teria in Stream Waters,	Exposed to Ring C-14-Labeled Carbofuran Using ITLC Silica Gel Strips,
W74-01564 5C	W74-01645 5B	W74-01577 5A

FISH FOOD

FISH FOOD Monitoring Channel Catfish Use of a Demand Feeder,	Tallahala Creek Lake, Pascagoula River Basin. Mississippi (Final Environmental Impact State- ment).	Changes in Species Composition of Phytoplankton Due to Enrichment by N, P, and Si of Water From a North Florida Lake,
W74-01237 8I	W74-01610 4A	W74-01503 5C
FISH HABITATS Longitudinal Distribution and Habitat of the Fishes of Mason Creek, an Upper Roanoke	FLOOD FORECASTING Hydrograph Simulation Models of the Hill- sborough and Alafia Rivers, Florida: A Prelimi- nary Report,	Hydrograph Simulation Models of the Hill- sborough and Alafia Rivers, Florida: A Prelimi- nary Report, W74-01611 4A
River Drainage Tributary, Virginia, W74-01592 2I	W74-01611 4A	W/4-01011
FISH PREDATION Further Studies of Fish Predation on Salmon	FLOOD PLAINS Areas of Possible Flooding in Knox County,	A Bill to Provide for the Establishment of the Guana River National Park in the State of Florida.
Stocked in Maine Lakes,	Tennessee,	W74-01617 6E
W74-01603 2H	W74-01269 7C	FLORIDA (APALACHICOLA RIVER)
FISHERIES	Promoting Environmental Quality Through	Biology of the Alabama Shad in Northwest
Fisheries and Fish Culture in Israel in 1971, W74-01570 6B	Urban Planning and Controls, W74-01470 5D	Florida, W74-01248 2I
		FLOW
FISHERY Limnology and Fishery Biology of Black Lake,	A Linear Programming Approach to Floodplain Land Use Planning in Urban Areas,	Experimental Investigation of the Effect of Sal- tating Sediments on Kinematics of Flow (Ek-
Northern Saskatchewan,	W74-01490 3D	sperimental noye issledovaniye vliyaniya sal'-
W74-01234 2H	FLOOD PROTECTION	tiruyushchikh nanosov na kinematiku potoka),
FISHES	Report on Laurel Creek Channel Improve-	W74-01134 2J
The Amount of Space Available for Marine and	ments, Waterloo and Bridgeport, Ontario.	
Freshwater Fishes,	W74-01482 4A	A Method of Forecasting the Building of a
W74-01561 2I		River Bar (Metod prognoza pereformirovaniy
FISHKILL	Floodland and Shoreland Development Guide. W74-01483 4A	rechnogo bara), W74-01388 2J
Supersaturation of Nitrogen in Water During	FLOODING	FLOW CONTRACTIONS
Passage Through Hydroelectric Turbines at	Spring Flooding and Fauna (In Russian),	Boundary Contractions as Controls in Two-
Mactaquac Dam, W74-01432 5C	W74-01261 2I	Layer Flows,
W74-01432 3C		W74-01276 8B
FLAME ABSORPTION	FLOODPLAIN MANAGEMENT	FLOW CONTROL
Lateral Diffusion Interferences in Flame	Floodland and Shoreland Development Guide.	Boundary Contractions as Controls in Two-
Atomic Absorption and Emission Spec-	W74-01483 4A	Layer Flows,
trometry,	FLOODS	W74-01276 8B
W74-01342 2K	Objective Regionalization of Peak Flow Rates,	
FLAME EMISSION	W74-01174 4D	FLOW MEASUREMENT
Lateral Diffusion Interferences in Flame	Effect of the Desna River Flood on Develop-	Single-Velocity Method in Measuring
Atomic Absorption and Emission Spec-	ment of Vegetation and Flora of the Oster Out-	Discharge, W74-01161 2C
trometry,	skirts (Ukranian)	W/4-01101
W74-01342 2K	W74-01362 2I	FLOW PROFILES
FLAME EMISSION SPECTROMETRY		Stability and Reach Length in Water Surface
Evaluation of Flame Emission Determination	FLORA	Profile Determination,
of Phosphorus in Water,	Effect of the Desna River Flood on Develop- ment of Vegetation and Flora of the Oster Out-	W74-01152 2E
W74-01116 5A	skirts (Ukranian)	FLOW RATES
	W74-01362 2I	Single-Velocity Method in Measuring
FLAME PHOTOMETRY		Discharge,
Evaluation of Flame Emission Determination of Phosphorus in Water,	FLORIDA	W74-01161 2C
W74-01116 5A	Comparison of Gage and Radar Methods of	FLOWMETERS
	Convective Precipitation Measurement, W74-01149 2B	Rotameter.
FLAMELESS ATOMIC ABSORPTION	W/4-01149 2B	W74-01500 7B
SPECTROPHOTOMETRY	Chemical Relationships Between Surface	
Determination of Mercury After Room Tem-	Water and the Ground in South Florida,	FLUCTUATIONS
perature Digestion by Flameless Atomic Ab- sorption,	W74-01153 2K	Division of the United States into Regions Ac- cording to Cophasal Fluctuations of Annual
W74-01315 5A	Tidewater Shorelines in Broward and Palm	Runoff (Rayonirovaniye territorii SShA po sin-
	Beach Counties, Florida: An Analysis of	faznosti kolebaniy godovogo stoka rek),
FLAVOBACTERIUM	Characteristics and Changes Interpreted from	W74-01140 2E
Inhibition by Fatty Acids of the Biodegradation	Color, Color Infrared and Thermal Aerial	
of Petroleum, W74-01537 5B	Imagery,	FLUID FRICTION Turbulent Fluid Friction of Rotating Disks.
	W74-01220 2L	W74-01640 8C
FLOATING PLANTS	A Bill to Establish the Canaveral National	
Element Constitution of Selected Aquatic	Seashore in the State of Florida.	FLUID MECHANICS
Vascular Plants from Pennsylvania: Submersed	W74-01457 6E	Turbulent Fluid Friction of Rotating Disks,
and Floating Leaved Species and Rooted Emer- gent Species.	Utility Provisions Applysis for Post Control	W74-01640 8C
W74-01526 5A	Utility Provisions Analysis for East Central Florida.	FLUORINE
3A	W74-01480 6D	Thermodynamics of Acid-Base Equilibria. II.
FLOOD CONTROL		Ionization of m- and p-Hydrox-
Storm Drainage and Flood Control for	Availability of Fresh Water in the East Central	ybenzotrifluoride and the Concept of Fluorine
Metropolitan Denver. W74-01475 4A	Florida Planning Region. W74-01481 6D	Double Bond-No Bond Resonance, W74-01226 2K
W74-01475 4A	W74-01481 6D	W74-01226 2K

Fluorometric Quantitation of Gallium in Biolog-	Profile of the Vegetation of the Elburs Moun-	Fluorometric Quantitation of Gallium in Biolog-
	tain Range (Northern Iran), (In German),	ical Materials at Nanogram Levels,
ical Materials at Nanogram Levels, W74-01344 2K	W74-01385 21	W74-01344 2K
Fluorometric Determination of Selenium in	FORESTS	GALVESTON BAY
Water with 2,3-Diaminonaphthalene,	Experimental Establishment of Forest Planta-	Microbial Flora and Level of Vibrio
W74-01399 5A	tions on Sands, in Accordance with the Idea of	Parahaemolyticus of Oysters (Crassostrea Vir-
	G. N. Vysotskii (In Russian),	ginica), Water and Sediment from Galvestor
FLUOROSIS	W74-01569 2I	Bay,
Effect of Partial Defluoridation of a Water		W74-01548 50
Supply on Dental Fluorosis: Final Results in	FRANCE (GAPEAU RIVER BASIN)	
Bartlett, Texas, After 17 Years,	Contribution to Physicochemical Study of	GAS CHROMATOGRAPHY
W74-01578 5F	Some Springs of the Gapeau River Basin (Var),	Variation of Organochlorine Residue Level
	W74-01288 2K	with Age in Gulf of St. Lawrence Harp Seals
FLUSHING		(Pagophilus Groenlandicus),
Phytoplankton Nutrients and Flushing of Inlets	FRANCE (HAUTE-SAVOIE)	W74-01300 5A
on the Coast of Nova Scotia,	A Diseased Trout: Microbiological Study of Its	Microdetermination of Chloro-S-Triazines in
W74-01471 5B	Principal Organs and Its Environment,	
BOOD WARNES	W74-01267 5C	Soil by Gas-Liquid Chromatography with Nickel Electron Capture or Electrolytic Con
FOOD HABITS	PREPAR BRUING	ductivity Detection,
Food Consumption of the Free-Living Aquatic	FREEZE DRYING	W74-01304 5A
Nematode Pelodera Chitwoodi,	Simple Inexpensive Freeze-Drying Procedure,	W 74-01304 32
W74-01225 5A	W74-01339 7B	Practical Methods for Derivatizing and Analyz
	FRESHWATER	ing Bacterial Metabolites with a Modified Auto
FOOD PROCESSING INDUSTRY		matic Injector and Gas Chromatograph,
Wastewater Characterization of Sweet Potato	Soluble Aluminum in Marine and Fresh Water	W74-01336 5/
Processing,	by Gas-Liquid Chromatography,	11 14-01550
W74-01324 5A	W74-01446 5A	Simple Direct Combination of Gas Chromatog
	FRESHWATER FISH	raphy and Vapor Phase Infrared Spectrometry,
FORECASTING		W74-01355 5A
Longshore Current Velocity: A Review of	The Chemical Oxygen Demand of Waters and Biological Materials from Ponds.	
Theory and Data,		Precolumn Inlet System for the Gas Chromato
W74-01187 2E	W74-01543 5C	graphic Analysis of Trace Quantities of Short
	FRICTION	Chain Aliphatic Amines,
Computer Utilization of Hydrological Data for	Effects of Friction and Surface Tide Angle of	W74-01357 54
North Nashwaaksis Representative Basin,	Incidence on the Coastal Generation of Internal	
W74-01294 7C	Tides,	Chlorinated Hydrocarbon Insecticides in Sedi
A Made A of Personalist the Publisher of a	W74-01190 2E	ments of Southern Lake Michigan,
A Method of Forecasting the Building of a	W/4-01190 2E	W74-01397 51
River Bar (Metod prognoza pereformirovaniy	Flow of a Valley Glacier with a Solid Friction	
rechnogo bara),	Law,	Rapid Gas Chromatographic Method for Deter
W74-01388 2J	W74-01377 2C	mination of Residual Methanol in Sewage,
FOREIGN COUNTRIES		W74-01410 52
International Scientific and Technical Coopera-	FROST	Determination of Chlorinated Pesticides in
tion in the Field of Water Problems (Mezhdu-	A Reliable and Inexpensive Soil Frost Gage,	Whole Blood,
· · · · · · · · · · · · · · · · · · ·	W74-01574 2G	W74-01417 5/
narodnoye nauchno-tekhnicheskoye sotrud-		W/4-0141/
nichestvo v oblasti vodnykh problem),	FUNGAL METABOLITES	Analytical Methodology for Bioactive Com
W74-01138 6E	Determination of Griseofulvin by Time-	pounds. Photochemically Assisted Analysis o
FOREIGN PROJECTS	Resolved Phosphorimetry,	Chlorinated Hydrocarbon Pesticides in the
	W74-01224 5A	Presence of Polychlorinated Biphenyls,
International Scientific and Technical Coopera-		W74-01493 5/
tion in the Field of Water Problems (Mezhdu-	FUNGI	117 01705
narodnoye nauchno-tekhnicheskoye sotrud-	Determination of Griseofulvin by Time-	GAS EXCHANGE CHAMBER
nichestvo v oblasti vodnykh problem), W74-01138 6E	Resolved Phosphorimetry,	A New Type of Climatized Gas Exchang
W74-01138 6E	W74-01224 5A	Chamber for Net Photosynthesis and Trans
FOREIGN RESEARCH		piration Measurements in the Field,
Literature on Mercury: Availability of English	Algal Excretion of C-14-Labeled Compounds	W74-01568 2
Translations.	and Microbial Interactions in Cyanidium cal-	
	darium Mats,	GAS LIQUID CHROMATOGRAPHY
W74-01323 5A	W74-01510 5C	Gas-Liquid Chromatographic Determination of
FOREST	Winklife of Your blind Minnessesies often	Chlorpyriphos in Dursban Insecticide Formula
Protective Function of the Forest in Areas of	Viability of Lyophilized Microorganisms after	tions,
Waterwork Reservoirs, (In Czech),	Storage,	W74-01405 5/
W74-01582 4A	W74-01538 5C	W-1114 A-1-1- W-1-1-
17 7 7 1 3 0 2 AA	FUNGICIDES	Herbicide Analysis: Relationship Betwee
FOREST MANAGEMENT GUIDELINES	Ethylenethiourea Degradation,	Molecular Structure and Retention Index,
Development of a Time-Space Prediction		W74-01416 5/
Technique to Evaluate Snowpacks in and Ad-	W74-01340 5B	Soluble Aluminum in Marine and Fresh Wate
jacent to Forest Openings,	FUSARIUM-SPP	
W74-01231 3B	The Relationship Between Maple Canker In-	by Gas-Liquid Chromatography, W74-01446
	cidence and Precipitation,	W74-01446 5/
FOREST OPENINGS	W74-01602 2I	GAS-MEMBRANE ELECTRODES
Development of a Time-Space Prediction	11.1-01002 21	Reliability of an Ammonia Probe for Elec
Technique to Evaluate Snowpacks in and Ad-	GAGES	trometric Determination of Total Ammoni
jacent to Forest Openings,	A Reliable and Inexpensive Soil Frost Gage.	Nitrogen in Fish Tanks,
W74-01231 3B	W74-01574 2G	W74-01433 5.
35		

GAS SOLID CHROMATOGRAPHY

Cation Exchange Resins, W74-01495 GELIDIBLLA ACEROSA Physiological Ecology of Gelidiclla Acerosa (Forskall Peldmann et Hamel, W74-01324 GEOCHEMISTRY State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel'nykh elementov v poverkhnostnykh vodakh), W74-01395 Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopany) sostav geliya termal'nykh istochnikov Islandii), W74-01396 EgoLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 Categories of Relative Feasibility for Septical Riller Filed's in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Riller Filed's in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Rank Filter Filed's in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Rank Filter Filed's in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Rank Filter Filed's in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Rank Filter Filed's in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Rank Filter Filed's in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Rank Filter Filed's in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Rank Filter Filed's in Knox County, Tennessee, W74-01139 Categories of Relative Feasibility for Septical Rank Filter Filed's in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Rank Filter Filed's in Knox County, Tennessee, W74-01139 Categories of Relative Feasibility for Septical Rank Filter Filed's in Knox County, Tennessee, W74-01390 Categories of Relative Feasibility for Septical Rank Filter Filed's in Knox County, Tennessee, W74-01390 Categories of Relative Feasibility for Septical Ra	Gas Solid Chromatography on Macroreticular Cation Exchange Resins, W74-01495 Available Exchange Resins, W74-01495 SA BLIDIELLA ACEROSA (Physiological Ecology of Gelidiella Aceroas (Forsskal) Feldmann et Hamel, W74-01361 SCOCHEMISTRY State of Rare Earth Elements in Surface Waters (O sottoyani redkozemel'nykh elementov v poverkhnostnykh vodakh), W74-01395 ZK (Sotopic Composition of Helium in Thermal Springs of Iceland (Izotopayy sostav geliya termal'nykh isotonikov Islandii), W74-01396 Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01145 SOLOGIC MAPPING Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01145 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01145 Soli Association Map of Knox County, Tennessee, W74-01146 W74-01146 TC Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01146 W74-01146 TC Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01165 To Mineral Resources, Geological Structure and Landform Surveys, W74-01167 W74-01166 To Careas with Abundant Sinkholes in Knox County, Tennessee, W74-01167 W74-01168 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01169 W74-01178 To Chromatography on Macroeral Indian, W74-01178 Soli Association Map of Knox County, Tennessee, W74-01186 To Chromatography on Macroeral Indian, W74-01187 To Coverburden Related to Type of Bedrock and Landform Surveys, W74-01187 W74-01198 Solidos Glacier Goldicier Motion, W74-01188 To Coverburden Related to Type of Bedrock and Landform Surveys, W74-01188 To Coverburden Related to Type of Bedrock and Landform Surveys, W74-01188 To Coverburden Related to Type of Bedrock and Landform Surveys, W74-01188 To Coverburden Related to Type of Bedrock and Landform Surveys, W74-01188 To Coverburden Related to Type of Bedrock and Landform Surveys, W74-01188 To Coverburden Related to Type of Bedrock and La
Gas-Solid Chromatography on Macroreticular Cation Exchange Resins, W74-01495 GELIDIELLA ACEROSA Physiological Ecology of Gelidiella Acerosa (Forsakal) Feldmann et Hamel, W74-01361 GECOHEMISTRY State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel' nykh elementov v poverkhnostnykh vodakh), W74-01395 Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh siochnikvo Islandii), W74-01396 GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 GV74-01143 GV74-01144 CC Categories of Relative Feasibility for Septicrans, Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01166 GELOCHERS Simultaneous Determination of Manganese, Candium, Antimony and Mercury in Glacial Ice by Radioactivation, W74-01361 SC CALCERS Problems in Hydrology of Glaciers and Glacierized Areas (Problemy gindrologii led-mikov i lednikovykh rayonov), W74-01132 CAcquisition, Storage and Processing of Glacier Inventory Data, W74-01292 Calegories Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh siochnikov Islandii), W74-01396 Egilicories Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh siochnikov Islandii), W74-0136 Ecologic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh siochnikov Islandii), W74-0136 Ecologic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh siochnikov Islandii), W74-0136 Ecologic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh siochnikov Islandii), W74-01380 Ecologic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh siochnikov	Gas-Solid Chromatography on Macroreticular Cation Exchange Resins, Y4-04059 5. A Mercury in Glacial Lee by Radioactivation, W74-0136 5. Copper, Arsenic, Cadamim, Antimory and Mercury in Glacial Ice by Radioactivation, W74-0136 5. A GRAND RIVER (ONT) Review of Planning for the Grand River Waters (O sototypani redkozemel' nykh elements or very overkhnostnykh vodakh), W74-01379 2K Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopany) sostava geliya termal rykh isotenikov 1 lednikovykh rayonov), W74-01396 2K SOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01377 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01145 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01146 7C Categories of Relative Feasibility for Spring-Tank Filter Fields in Knox County, Tennessee, W74-01146 7C Categories of Relative Feasibility for Spring-Tank Filter Fields in Knox County, Tennessee, W74-01146 7C Categories of Relative Feasibility for Spring-Tank Filter Fields in Knox County, Tennessee, W74-01146 7C Categories of Relative Feasibility for Spring-Tank Filter Fields in Knox County, Tennessee, W74-01165 7C Categories of Relative Feasibility for Spring-Tank Filter Fields in Knox County, Tennessee, W74-01165 7C Categories of Relative Feasibility for Spring-Tank Filter Fields in Knox County, Tennessee, W74-01165 7C Categories of Relative Feasibility for Spring-Tank Filter Fields in Knox County, Tennessee, W74-01165 7C Categories of Relative Feasibility for Spring-Tank Filter Fields in Knox County, Tennessee, W74-01165 7C Categories of Relative Feasibility for Spring-Tank Filter Fields in Knox County, Tennessee, W74-01178 7C Categories of Relative Feasibility for Spring-Tank Filter Fields in Knox County, Tennessee, W74-01178 7C Categories of Relative Feasibility for Spring-Tank Filter Fields in Knox County, Tennessee, W74-01187 7C Categories of Relative Feasibility for
Cation Exchange Resins, W74-01355 5A GELIDIELLA ACEROSA Physiological Ecology of Gelidiella Acerosa (Forsskal) Feldmann et Hamel, W74-01361 GEOCHEMISTRY State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel'nykh elementov y powerkhnostnykh vodakh), W74-01395 Isotopic Composition of Helium in Thermal Springs of Idealand (Exotopany) sostav geliya termal'nykh istochnikov Islandii), W74-01396 EGEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 Categories of Relative Feasibility for Septical Rile Filter Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Rile Filter Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Rile Filter Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septical Resources, Geological Structure and Landform Surveys, W74-011390 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01146 Careas with Abundant Sinkholes in Knox County, Tennessee, W74-01166 Categories of Relative Feasibility for Septical Resources, Geological Structure and Landform Surveys, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01166 Categories of Relative Feasibility for Septical Resources, Geological Structure and Landform Surveys, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas wi	Copper, Arsenic, Cadmium, Antimopa and Mercury in Glacial Ice by Radioactivation, W74-01351 SLIDIELLA ACEROSA Physiological Ecology of Gelidiella Acerosa (Forsskal) Feldmann et Hamel, W74-01424 5C COCHEMISTRY State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel'nykh elementov poverkhostnykh vodakh). W74-01135 2K M74-01135 2K M74-01135 2K Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii), W74-01396 2K COLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septicarian Knox County, Tennessee, W74-01146 7C Categories of Relative Feasibility for Septicarian Knox County, Tennessee, W74-01146 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C W74-01146 7C W74-01376 Carea with Abundant Sinkholes in Knox County, Tennessee, W74-01146 7C W74-01160 7C W74-01178 Carea with Abundant Sinkholes in Knox County, Tennessee, W74-01190 7C W74-01160 7C W74-01178 Colory Color Septicarian Color of Color o
Mercury in Glacial Ice by Radioactivation, W74-01311 GELIDIELLA ACEROSA Physiological Ecology of Gelidiella Acerosa (Forsskal) Feldmann et Hamel, W74-01424 SCECOREMISTRY State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel'nykh elementov v poverkhnostnykh vodakh), W74-01395 KY4-01352 Isotopic Composition of Helium in Internal Springs of Iceland (Izotopayy sostaw geliya termal'nykh istochnikov Islandii), W74-01396 GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 Overburden Related to Type of Bedrock, Knox County, Tennessee, W74-01145 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01145 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01146 Categories of Relative Feasibility for Septican River Fields in Knox County, Tennessee, W74-01390 Categories of Relative Feasibility for Septican	Mercury in Glacial Ice by Radionctivation, W74-01361 Schließellde ACEROSA Physiological Ecology of Gelidiella Acerosa (Forskal) Feldmann et Hamel, W74-01362 COCHEMISTRY State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel'nykh elemenov y poverkhnostnykh vodakh), W74-01379 Set of Rare Earth Elements in Surface W74-01379 Set osotoyanii redkozemel'nykh elemenov y poverkhnostnykh vodakh), W74-01379 Set osotoyanii redkozemel'nykh elemenov y poverkhnostnykh vodakh), W74-01379 Set osotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii), W74-01379 Set osotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii), W74-01379 SollOLGIC MAPPING Engineering Characteristics of Overburden in Espineering Characteristics of the Bedrock Knox County, Tennessee, W74-01379 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock Knox County, Tennessee, W74-01379 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock Knox County, Tennessee, W74-01379 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock Knox County, Tennessee, W74-01379 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock Knox County, Tennessee, W74-01379 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock Knox County, Tennessee, W74-01379 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock Knox County, Tennessee, W74-01379 Coverburden Related to Type of Bedrock and Law, U.S.A., W74-01379 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock Knox County, Tennessee, W74-01379 Coverburden Related to Type of Bedrock and Law, U.S.A., W74-01379 Coverburden Related to Type of Bedrock and Law, U.S.A., W74-01379 Coverburden Related to Type of Bedrock and Law, U.S.A., W74-01379 Coverburden Related to Type of Bedrock
GELIDIELLA ACEROSA Physiological Ecology of Gelidiella Acerosa (Forskal) Peldmann et Hamel, W74-01424 5C GEOCHEMISTRY State of Rare Earth Elements in Surface Waters (O soatoyanii redkozemel'nykh elemen- tov y poverkhnostnykh vodakh), W74-01395 Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopayy sostav geliya ter- mal'nykh istochnikov Islandii), W74-01396 EGEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 TC Overburden Related to Type of Bedrock, Knox County, Tennessee, W74-01144 Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 GEACIOHYDROLOGY GRANDRIVER (ONT) Review of Planning for the Grand Riv Watershed. W74-01478 Olacierized Areas (Problemy gidrologii led- nikovi lednikovykh rayonov). W74-01145 Cacquistion, Storage and Processing of Glacier Inventory Data, W74-01232 TC Cale Structure and Cacquistion, Storage and Processing of Glacier Inventory Data, W74-01292 TC Lec Calving into the Proglacial Generator Lake, Baffin Island, N.W.T., Canada, W74-01376 Cacquistion, Storage and Processing of Glacier Inventory Data, W74-01292 TC Lec Calving into the Proglacial Generator Lake, Baffin Island, N.W.T., Canada, W74-01376 Cacquistion, Storage and Processing of Glacier Inventory Data, W74-01290 TC Cacquistion, Storage and Processing of Glacier Inventory Data, W74-0128 GRANTS GRAVIMETRY Grophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizichesky opredeleniya moshchnosti lednika Maly Azau), W74-01390 Cacquistion, Storage and Processing of Glacier Inventory Data, W74-01380 GRAVIMETRY Geophysical Measurements of the Thickness of the Malyy Azau Glacier Geophysical Measurements On the Formation of	Physiological Ecology of Gelidiella Acerosa (Forsskal) Feldmann et Hamel, (W74-01424 5C COCHEMISTRY State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel'nykh elementov poverkhnostnykh vodakh), (W74-01395 5C Ratiopic Composition of Helium in Thermal Springs of Iceland (Izotopayy sostav geliya ter- mal'nykh istochnikov Islandii), (W74-01366 COLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Coverburden Related to Type of Bedrock, Knox County, Tennessee, W74-01145 7C Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01146 7C Cologic Association Map of Knox County, Tennessee, W74-01146 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01136 7C Cologic Association Map of Knox County, Tennessee, W74-01378 7C Cologic Association Map of Knox County, Tennessee, W74-01378 7C Cologic Association Map of Knox Co
Physiological Ecology of Gelidiella Acerosa (Forsskal) Feldmann et Hamel, W74-01424 State of Rare Earth Elements in Surface Waters (O soatopanii redkozemel'nykh elementov v poverkhnostnykh vodakh), W74-01395 Lisotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii), W74-01396 Egineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01145 Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01146 Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in K	GLACIERS Physiological Ecology of Gelidiella Acerosa (Forsskal) Feldmann et Hamel, W74-01424 SOCHEMISTRY State of Rare Earth Elements in Surface Waters (O soctopamit redkozemel'nykh elementov v poverkhnostnykh vodakh), W74-01375 Sottopic Composition of Helium in Thermal Springs of Iceland (Izetopany sostaw geliya termal'nykh istochnikov Islandii), W74-01396 SOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 COVERBURG Physiological Structure and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01146 COVERBURG Physiology of Glaciers and Composition of Helium in Thermal Springs of Iceland (Izetopany sostaw geliya termal'nykh istochnikov Islandii), W74-01376 SOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01146 COVERBURG Physiological Structure and Landorn Surveys, W74-01146 COVERBURG Physiological Structure and Landorn Surveys, W74-01146 COMPA-01146 COMPA-01146 COMPA-01146 COMPA-01146 COMPA-01146 COMPA-01146 COMPA-014166 COMPA-0141
Review of Planning for the Grand Riv Watershed. GEOCHEMISTRY State of Rare Earth Elements in Surface Waters (O nostoyanii redkozemel'nykh elementov v poverkhnostnykh vodakh), W74-01395 LSOLOPIC Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii), W74-01396 GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01144 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01146 Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-0190 Areas with Abundant Sinkholes in Knox Cou	Physiological Ecology of Gelidiella Acerosa (Forstkal) Feldmann et Hamel, W74-01424 5C COCHEMISTRY W74-0132 CACQUISITION W74-01292 CACQUISITION W74-01390 CACQUISITION W74-01390 CACQUISITION W74-01390 CACQUI
Problems in Hydrology of Glaciers and Glacierized Arteras (Problemy gidrologii lednikov) the draik (Problemy Gidrologii lednikov (Problemy Gidrologii lednikov) the draik (Problemy Gidrologii lednikov (Problemy Gidrologii led	Problems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii lednikov y heraponov), W74-01478 5D
GEOCHEMISTRY State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel'nykh elementov v poverkhnostnykh vodakh), W74-01395 Lisotopic Composition of Helium in Thermal Springs of Iceland (Izotopayy sostav geliya termal'nykh bistochnikov Islandii), W74-01396 GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 Categories of Relative Feasibility for Septicark Filter Fields in Knox County, Tennessee, W74-01145 Categories of Relative Feasibility for Septicark Filter Fields in Knox County, Tennessee, W74-01146 Composition of Helium in Thermal Springs of Iceland (Izotopayy sostav geliya termal'nykh bistochnikov Islandii), W74-01379 Categories of Relative Feasibility for Septicark Filter Fields in Knox County, Tennessee, W74-01146 Composition of Helium in Thermal Springs of Iceland (Izotopayy sostav geliya termal'nykh bistochnikov Islandii), W74-01376 Categories of Relative Feasibility for Septicark Filter Fields in Knox County, Tennessee, W74-01146 Composition, Storage and Processing of Glacier Inventory Data, W74-01292 Catelories of Mapping (Geofizicheskive opredeleniya moshchnosti lednika Maly Azau Glacier (Geofizicheskive opredeleniya moshchnosti lednika Maly Azau	### Occupance of the Bedrock and Engineering Characteristics of the Bedr
GEOCHEMISTRY State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel'nykh elementov v poverkhnostnykh vodakh), W74-01395 ZK Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopayy sostav geliya termal'nykh istochnikov Islandii), W74-01396 ZK GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 COverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 CC Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01145 Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01146 Comment W74-01292 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01378 Cocan Utilization and Coastal Zone Develorment. W74-01281 GRAVIMETRIC ANALYSIS Geophysical Measurements of the Thickness the Malyy Azau Glacier opredeleniya moshchnosti lednika Mal Azau), W74-01379 Composition of Helium in Thermal Springs of Iceland (Izotopayy sostav geliya termal spring into the Proglacial Generator Lake, Baffin Island, N.W.T., Canada, W74-01376 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01379 Composition, Storage and Processing of Glacier Inventory Data, W74-01290 Secondary Geophysical Measurements of the Thickness of Geophysical Measurements of the Thickness of the Malyy Azau Glacier opredleniya moshchnosti lednika Maly Azau), W74-01379 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01378 Cocan Utilization and Coastal W74-01286 GRAVIMETRY Geophysical Measurements of the Thickness of County M74-01379 Cocan Utilization and Coastal Processing of Glacier W74-01378 Cocan Utilization and Coastal P	### OCHEMISTRY ### OCHEMISTRY
GEOCHEMISTRY State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel'nykh elementor v poverkhnostnykh vodakh), W74-01395 Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopayy sostav geliya termal'nykh istochnikov Islandii), W74-01396 EGEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 TC Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 TC Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 CLACIOHYDROLOGY GRANTS Ocean Utilization and Coastal Zone Develorment. Devalution and Coastal Zone Develorment. Coean Utilization and Coastal Zone Develorment. Devalution and Coastal Zone Develorment. Devalution, Storage and Processing of Glacier Inventory Data, W74-01292 TC Ice Calving into the Proglacial Generator Lake, Baffin Island, N.W.T., Canada, W74-01396 2C Coverburden Related to Type of Bedrock, Knox County, Tennessee, W74-01144 TC Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01146 TC Soil Association Map of Knox County, Tennessee, W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74	SOCHEMSTRY State of Rare Earth Elements in Surface Waters (O osotoyanii redkozemel'nykh elementov v poverkhnostnykh vodakh), W74-01395 2K Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopany sostaw geliya termal'nykh istochnikov Islandii), W74-01376 2K COLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01144 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01166 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C REDLOGY Collogic Mapping Acquisition, Storage and Processing of Glacier Inventory Data, W74-01292 7C Acquisition, Storage and Processing of Glacier Inventory Data, W74-01292 7C Acquisition, Storage and Processing of Glacier Inventory Data, W74-01292 7C Acquisition, Storage and Processing of Glacier Inventory Data, W74-01292 7C Acquisition, Storage and Processing of Glacier Inventory Data, W74-01395 2C GRAVIMETRIC ANALYSIS Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01377 2C GRAVIMETRIC ANALYSIS Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01379 2C GRAVIMETRY Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01379 2C GRAVIMETRY Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01379 2C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01380 2C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July
State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel' nykh elementor v poverkhnostnykh vodakh), W74-01395 Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal' nykh istochnikov Islandii), W74-01396 GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 Categories of Relative Feasibility for Septical Rile Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, Glacion Structure and Landform Surveys, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, Glacion Structure and Landform Surveys, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, Glacion Structure and Landform Surveys, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, Glacion Structure and Landform Surveys, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, Glacion Structure and Landform Surveys, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, Glacion Structure and Landform Surveys, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, Glacion Structure and Landform Surveys, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, Glacion Structure and Landform Surveys, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160	State of Rare Earth Elements in Surface Waters (O sostoyami redkozemel'nykh elemento vy poverkhnostnykh vodakh), W74-01395 2K W74-01395 2K Sotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii), W74-01396 2K SOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01377 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01378 Categories of Relative Feasibility for Septicating Characteristics of the Bedrock Roox County, Tennessee, W74-01349 Categories of Relative Feasibility for Septicating Characteristics of Relative Feasibility for Septicating Characteristics of the Bedrock Roox County, Tennessee, W74-01379 Categories of Relative Feasibility for Septicating Characteristics of the Bedrock Roox County, Tennessee, W74-01379 Categories of Relative Feasibility for Septicating Characteristics of the Bedrock Roox County, Tennessee, W74-01340 Categories of Relative Feasibility for Septicating Characteristics of the Bedrock Roox County, Tennessee, W74-01340 Categories of Relative Feasibility for Septicating Characteristics of the Bedrock Roox County, Tennessee, W74-01340 Categories of Relative Feasibility for Septicating Characteristics of the Malyy Azau Glacier Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau, Water State Feath Elements of the Thickness of the Malyy Azau Glacier Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau, Water State Feath Elements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 Categories of Relative Feasibility for Septicating Characteristics of the Malyy Azau Glacier Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau, Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau, Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau, Glacier Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau, Gla
State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel'nykh elementor v poverkhnostnykh vodakh), W74-01395 Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii), W74-01396 EgoLoGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01146 Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01360 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 Areas with Abundant Sinkholes in	Without State of Rare Earth Elements in Surface Waters (O osotoyanii redkozemel'nykh elemen tov y poverkhnostnykh vodakh). W74-01395 ZK Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopayy sostav geliya ter- mal'nykh istochnikov Islandii), W74-01396 ZK COLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-0137 COverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-0137 CT Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01146 CT Soil Association Map of Knox County, Tennessee, W74-01146 CT M74-01146 CT Acquisition, Storage and Processing of Glacier Inventory Data, W74-0129 TC Ice Calving into the Proglacial Generator Lake, Baffin Island, N.W.T., Canada, W74-01376 ZC Flow of a Valley Glacier with a Solid Friction Law, W74-01377 CO Seismic Evidence for Glacier Motion, W74-01378 Coentrol Mapping Characteristics of the Bedrock, Knox County, Tennessee, W74-01147 TC Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01139 Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01130 Coean Utilization and Coastal Zone Development. W74-01281 CRAVIMETRIC ANALYSIS Geophysical Measurements of the Thickness of the Malyy Azau Glacier Motion, W74-01377 Coerburden Alexanda Solid Friction Law, W74-01379 Coentrol Lake, W74-01379 Coentrol Lake, Baffin Island, N.W.T., Canada, W74-01379 Coentrol Lake, W74-01379 Coentrol Lake, W74-01379 Coentrol Lake, W74-0130 Coentrol Lake, Baffin Island, N.W.T., Canada, W74-01379 Coentrol Lake, W74-01379 Coentrol Lake, W74-01390 Coentrol Lake,
State of Rare Earth Elements in Surface Waters (O sostoyamir edkozemet'nykh elementory v poverkhnostnykh vodakh), W74-01395 2K W74-01395 2K Hsotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii), W74-01396 2K GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 N74-01396 Cocan Utilization and Coastal Zone Development. W74-01292 Tocantements of the Thickness of the Malyy Azau Glacier (Geofizicheskiv opredeleniya moshchnosti lednika Mal Azau), W74-01390 GRAVIMETRY Geophysical Measurements of the Thickness on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 Cotategories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 Nort-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01390 Soil Association Map of Knox County, Tennessee, W74-01146 Nort-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01390 Nort-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01140 Nort-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01390 Nort-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01140 Nort-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01160 Nort-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01160 Nort-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01390 Nort-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01390 Nort-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01140 Nort-Term Snow Melt and Ablation Derived from	Waters (O sotopanii reflexezemel'nykh elementor v poverkhnostnykh vodakh), Waters (Osotopanii reflexezemel'nykh elementov poverkhnostnykh vodakh), Waters (Osotopanii reflexezemel'nykh vodakh), Waters (Osotopanii reflexes of the maly y acu Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau Glacier (Geofizicheskiye opr
Acquisition, Storage and Processing of Clacker W74-01292 W74-0	lastopic Composition of Helium in Thermal Springs of Iceland (Izotopayy sostav geliya termal'nykh istochnikov Islandii), W74-01396 2K BOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01377 Coverburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 TC Categories of Relative Feasibility for Septicank, Knox County, Tennessee, W74-01146 To W74-01
tov v poverkhnostnykh vodakh), W74-01395 ZK W74-01395 ZK W74-01395 ZK W74-01292 TC GRAVIMETRIC ANALYSIS GRAVIMETRIC ANALYSIS GROLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01376 W74-01376 ZC W74-01377 W74-01377 W74-01377 ZC Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 TC Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01390 GRAVIMETRIC ANALYSIS GROPhysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Maly Azau), W74-01378 W74-01378 CC Seismic Evidence for Glacier Motion, W74-01379 CC Soil Association Map of Knox County, Tennessee, W74-01390 CC Soil Association Map of Knox County, Tennessee, W74-01380 CC Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Maly Azau), W74-01390 CC Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Maly Azau), W74-01390 CC Goophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Maly Azau), W74-01390 CC Coastal Processee and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01162 Planned Data Storage Methods for the Intentional Field Year for the Gre	Inventory Data, W74-01395 2K Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii), W74-01396 2K W74-01397 2C W74-01397 2C W74-01397 2C W74-01398 2C W74-01399 2C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01399 2C Actegories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01146 7C Wineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C RECOLOGY 8D Actanomy Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandia, N.W.T., Canada, W74-01366 2K W74-01376 2C Calver with a Solid Friction Law, W74-01397 2C GRAVIMETRY Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 2C Castal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H International Field Year for the Great Lakes, W74-01129 3C Castal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GRAVIMETRY Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01399 2C Castal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GRAVIMETRY Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01399 2C Gastal Proc
Inventory Data, W74-01292 7C Isotopic Composition of Helium in Thermal Springs of Iccland (Izotoppayy sostav geliya termal'nykh istochnikov Islandii), W74-01396 2K GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01146 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 The Calving into the Proglacial Generator Lake, Baffin Island, N.W.T., Canada, W74-01376 2C Selismic Evidence for Glacier with a Solid Friction Law, W74-01377 2C Seismic Evidence for Glacier Motion, W74-01378 2C Seismic Evidence for Glacier Motion, W74-01379 2C Soil Association Map of Knox County, Tennessee, W74-01144 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01190 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01190 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01190 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01190 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01190 7C Mineral Resourc	Inventory Data, W74-01395 2K Inventory Data, W74-01396 2K Inventory Data, W74-01292 7C Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopayy sosta y geliya termal'nykh istochnikov Islandii), W74-01396 2K SOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C REDLOGY 8C SINCH TRIC ANALYSIS GREAVIMETRIC ANALYSIS Geophysical Measurements of the Thickness of the Malyy Azau Glacier opredeleniya moshchnosti lednika Malyy Azau, Glacier opredeleniya moshchnosti lednika Malyy M74-01379 2C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01296 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01296 7C Roephysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01390 2C Roephysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74
Sotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii), W74-01396	Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii). Each Collogic Mapping Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01378 W74-01378 W74-01378 Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01146 W74-01146 W74-01146 W74-01146 W74-01166 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 W74-01270 W74-01270 W74-01270 W74-01270 W74-01280 W74-0128
Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopnys sostav geliya termal'nykh istochnikov Islandii), W74-01396 2K GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 Ice Calving into the Proglacial Generator Lake, Baffin Island, N.W.T., Canada, W74-01376 2C Baffin Island, N.W.T., Canada, W74-01390 Flow of a Valley Glacier with a Solid Friction Law, W74-01377 2C Seismic Evidence for Glacier Motion, W74-01378 2C Seismic Evidence for Glacier Motion, W74-01378 2C On the Formation of Small Marginal Lakes on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01390 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01390 Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 2C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 2C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities Constant Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01162 Parally Azau Glacier opredeleniya and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01390 Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01162 Parally Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau Glacier opredeleniya and Ablation Derived from H	Ice Calving into the Proglacial Generator Lake, Baffin Island, N.W.T., Canada, W74-01396 Education (Izotopony) sostave geliya termal'nykh istochnikov Islandii), W74-01390 Education (Izotopony) sostave geliya termal'nykh istochnikov Islandii, N.W.T., Canada, W74-01390 Education (Izotopony) sostave geliya termal'nykh istochnikov Islandii, N.W.T., Canada, W74-01390 Education (Izotopony) sostave geliya termal'nykh istochnikov Islandii, N.W.T., Canada, W74-01390 Education (Izotopony) sostave geliya termal'nykh istochnikov Islandii, N.W.T., Canada, W74-01390 Education (Izotopony) sostave geliya termal'nykh istochnikov Islandii, N.W.T., Canada, W74-01390 Education (Izotopony) sostave geliya termal'nykh istochnikov Islandii, N.W.T., Canada, W74-01390 Education (Izotopony) sostave geliya ter
Springs of Iceland (Izotopnyy sostav geliya termal'nykh istochnikov Islandii), W74-01396 2K GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tanik Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01390 Ice Calving into the Proglacial Generator Lake, Baffin Island, N.W.T., Canada, W74-01376 2C Flow of a Valley Glacier with a Solid Friction Law, W74-01377 Coephysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti and portion), W74-01378 Seismic Evidence for Glacier Motion, W74-01378 Categories of Relative Feasibility for Septic-Tanik Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01180 GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01377 2C Seismic Evidence for Glacier Motion, W74-01378 Categories of Relative Feasibility for Septic-Tanik Filter Fields in Knox County, Tennessee, W74-01149 Categories of Relative Feasibility for Septic-Tanik Filter Fields in Knox County, Tennessee, W74-01379 Soil Association Map of Knox County, Tennessee, W74-01380 GEOLOGIC MAPPING Flow of a Valley Glacier with a Solid Friction Law, W74-01379 Categories of Relative Feasibility for Septic-Tanik Filter Fields in Knox County, Tennessee, W74-01379 Soil Association Map of Knox County, Tennessee, W74-01380 Geophysical Measurements of the Malyx Azau Glacier opredeleniya moshchnosti and Mass-Balance Measureme	Callying into the Proglacial Generator Lake, Baffin Island, N.W.T., Canada, W74-01376 2C Scipniseering Characteristics of Overburden in Knox County, Tennessee, W74-0143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-0144 7C Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01145 7C Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01146 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01390 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau Glacier (Geofizicheskiye opredeleniya
Springs of Iceland (Izotophyy sostav gellya termal'nykh istochnikov Islandii), W74-01396 ZK GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Mineral Resources, Geological Structure and Landform Surveys, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 Baffin Island, N.W.T., Canada, W74-01376 2C Flow of a Valley Glacier with a Solid Friction Law, W74-01377 2C Seismic Evidence for Glacier Motion, W74-01378 Seismic Evidence for Glacier Motion, W74-0138 2C GRAVIMETRY Geophysical Measurements of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Mal Azau), W74-01390 W74-01390 GRAVIMETRY Geophysical Measurements of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Mal Azau), W74-01390 GRAVIMETRY Geophysical Measurements of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Mal Azau), W74-01390 GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01162 Planned Data Storage Methods for the Intentional Field Year for the Great Lakes, W74-01296 GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	Baffin Island, N.W.T., Canada, W74-01396 2K COLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Contact of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau Glacier
Mainly in Stochmico Visiandily, W74-01396 2K GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 TC Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 Mineral Resources, Geological Structure and Landform Surveys, W74-01390 Mineral Resources, Geological Structure and Landform Surveys, W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 Seismic Evidence for Glacier Motion, W74-01378 Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01145 Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01390 Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01390 Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01390 Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01390 Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01390 Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01390 Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01390 Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01390 Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01390 Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01390 Categories of Relative Feasibility for Septicank Filter Fields in Knox County, Tennessee, W74-01390 Categories o	W74-01396 2K SOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01378 Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 W74-01146 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 W74-01376 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 Total Soil Association Map of Knox County, Tennessee, W74-01270 Total Soil Association Map of Knox County, Tennessee, W74-01380 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Tennessee, W74-01390 Total Soil Association Map of Knox County, Te
GEOLOGIC MAPPING Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee. W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 Flow of a Valley Glacier with a Solid Friction Law, W74-01377 2C GRAVIMETRY Geophysical Measurements of the Thickness on the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Mal Azau), W74-01379 2C Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01180 Geophysical Measurements, W74-01390 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Maly Azau), W74-01160 Geo	Flow of a Valley Glacier with a Solid Friction Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01146 7C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti at Sheboygan, Wisconsin, July, 1972, W74-01390 2C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H International Field Year for the Great Lakes, W74-01270 7C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, Azau), W74-01290 7C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, Acoperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin.
Flow of a Valley Glacier with a Solid Friction Law, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee. W74-01146 Soil Association Map of Knox County, Tennessee, W74-01166 Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Flow of a Valley Glacier with a Solid Friction Law, W74-01377 Seismic Evidence for Glacier Motion, W74-01378 On the Formation of Small Marginal Lakes on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01390 GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 From Heat- and Mass-Balance Measurements, W74-01130 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Maly N74-01380 Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 From Heat- and Mass-Balance Measurements, W74-01162 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Maly Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Maly N74-01390 From Heat- and Mass-Balance Measurements, W74-01130 From Heat- and Mass-Balance Measurements, W74-01162 From Heat- and Mass-Balance Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Maly N74-01180 From Heat- and Mass-Balance Measurements, W74-01130 From Heat- and Mass-Balance Measurements, W74-01162 From	Flow of a Valley Glacier with a Solid Friction Law, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01380 7C Soil Association Map of Knox County, Tennessee, W74-01390 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01390 7C Soil Association Map of Knox County, Tennessee, W74-01390 7C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchn
Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01378 Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 To Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Law, W74-01377 Seismic Evidence for Glacier Motion, W74-01378 2C Geophysical Measurements of the Thickness on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 2C GRAVIMETRY Geophysical Measurements of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Maly Azau), W74-01390 Castal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Maly Azau), W74-01390 To Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Maly W74-011390 To Heat-and Mass-Balance Measurements, W74-01390 To Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski Malyy Azau Glacier (Geofizicheski Malyy Azau), W74-01160 To Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski Malyy Azau), W74-01190 To Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski Malyy Azau), W74-01190 To Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski Malyy Azau), W74-01190 To Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski Malyy Azau), W74-01190 To Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski Malyy Azau), W74-01190 To Geophysical Measurements, W74-01130 To Geophysical Measurements, W74-01130 To Geophysical Measurements, W74-01130 To Geop	Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee. W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Boil Association Map of Knox County, Tennessee, W74-01270 7C Boil Association Map of Kn
Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee. W74-01146 Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 Law, W74-01377 Seismic Evidence for Glacier Motion, W74-01378 Seismic Evidence for Glacier Motion, W74-01378 Constal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 The Formation of Small Marginal Lakes on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-0190 GREAT LAKES GREAT LAKES W74-01379 Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 W74-01380 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskive opredeleniya moshchnosti lednika Malyy Azau Glacier (Geofizicheskive deported from Heat- and Mass-Balance Measurements, W74-01162 Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskive deported from Heat- and Mass-Balance Measurements, W74-01162 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskive deported from Heat- and Mass-Balance Measurements, W74-01162 Geo	Engineering Characteristics of Overburden in Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01379 2C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Geophysical Measurements of the Thickness on the Juneau Leefield, South-Eastern Alaska, U.S.A., W74-01379 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01130 2C Geophysical Measurements of the Thickness on the Juneau Leefield, South-Eastern Alaska, U.S.A., W74-01379 2C Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01160 2H International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin. 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois,
Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee. W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 W74-01377 Seismic Evidence for Glacier Motion, W74-01378 2C Geophysical Measurements of the Thickness on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 2C Soil Association Map of Knox County, Tennessee, W74-01380 GRAYIMETRY Geophysical Measurements of the Malyy Azau Glacier (Geofizicheskiv opredeleniya moshchnosti lednika Mal Azau), W74-01390 GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01380 Geophysical Measurements of the Thickness on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01380 2C International Field Year for the Great Lakes, W74-01162 Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	Knox County, Tennessee, W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Wineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01399 7C Soil Association Map of Knox County, Tennessee, W74-01390 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01360 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01379 7C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01390 2C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01379 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01390 2C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01379 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01130 2H International Field Year for the Great Lakes, W74-01162 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, July, 1972, W74-01130 2H Geophysical Measurements of t
W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee. W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01160 7C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheski opredeleniya moshchnosti lednika Mal Azau), W74-01390 W74-01378 2C On the Formation of Small Marginal Lakes on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01130 Great Lakes W74-01146 7C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Mal Azau), W74-01390 GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 International Field Year for the Great Lakes, W74-01162 Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	W74-01143 7C Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01379 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-0130 2C W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Geophysical Marginal Lakes on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01300 2C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti alednika Malyy M74-01379 2C GREAT LAKES Great Lakes W74-01390 2C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, July, 1972, Wi74-01130 2C GREAT LAKES Great Lakes W74-01390 2C GREAT LAKES Great Lakes W74-01390 2C GREAT LAKES Great Lakes W74-01162 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, Wi74-01296 7C GREAT LAKES Great Lakes W74-01296 7C GREAT LAKES Grea
Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, Glacier Motion, W74-01378 Seismic Evidence for Glacier Motion, W74-01378 W74-01378 2C On the Formation of Small Marginal Lakes on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01390 W74-01390 Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 from Heat- and Mass-Balance Measurements, W74-01180 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Maly W74-01390 W74-01390 Flant Hally Azau Glacier (Geofizicheski W74-01390 W74-01390 The Maly Azau Glacier (Geofizicheski W74-01390 W74-01390 Flant Hall Maly Azau Glacier (Geofizicheski W74-01390 The Maly Azau Glacier (Geofizicheski W74-01390 The Maly Azau Glacier (Geofizicheski W74-01390 W74-01390 The Maly Azau Glacier (Geofizicheski W74-01390 The Maly Azau Glacier (Geofizicheski W74-01390 The Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01390 The Juneau Icefield, South-Ea	Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 TOC Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01379 Coll Association Map of Knox County, Tennessee, W74-0146 TOC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01380 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01380 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01380 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01380 TOC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01380 TOC Areas with Abundant Sinkhol
Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee. W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-0190 2C Areas with Abundant Sinkholes in Knox County, Tennessee, GREAT LAKES On the Formation of Small Marginal Lakes on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 2C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01160 7C Areas with Abundant Sinkholes in Knox County, Tennessee, GREAT LAKES GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 International Field Year for the Great Lakes, W74-01162 Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01379 7C Soil Association Map of Knox County, Tennessee, W74-01380 7C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy M74-01130 2C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H International Field Year for the Great Lakes. W74-01162 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES REGION 1948 1949 1940 1940 1940 1940 1940 1940 1940
Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee. W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Mal Azau), W74-01390 W74-01379 Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Maly W74-01390 W74-01390 GREAT LAKES W74-01390 W74-01162 Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	Overburden Related to Type of Bedrock and Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01399 7C Soil Association Map of Knox County, Tennessee, W74-01380 7C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Az
Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-0190 2C Areas with Abundant Sinkholes in Knox County, Tennessee, Gassial Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskive opredeleniya moshchnosti lednika Malyy Azau Glacier (Geofizicheskive opredeleniya moshchnosti lednika Malyy Azau), W74-01390 2C GREAT LAKES Flant W74-01390 W74-01130 GREAT LAKES GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 Urv4-01130 U	Engineering Characteristics of the Bedrock, Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C ECOLOGY ECOLOGY On the Formation of Small Marginal Lakes on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 2C South-Eastern Alaska, U.S.A., W74-01379 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01130 2H International Field Year for the Great Lakes. W74-01162 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C W74-01390 2C GREAT LAKES W74-01130 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C W74-01390 2C GREAT LAKES W74-01130 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H International Field Year for the Great Lakes, W74-01162 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H The Maly Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01162 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2C GREAT LAKES Coastal Processes Sheboygan, Wisconsin, July, 1972, W74-01130 2C GREAT LAKES Coastal Processes Sheboyg
Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee. W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 On the Formation of Small Marginal Lakes on the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01380 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau,) W74-01390 W74-01390 W74-01390 Flant Lakes W74-0130 W74-0130 Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 GREAT LAKES GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 Flant Head Ablation Derived from Heat- and Mass-Balance Measurements, W74-01380 W74-01390 GREAT LAKES GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01162 W74-01162 Flant Lakes W74-01296 GREAT LAKES Flant Heat- W74-01390 GREAT LAKES Flant Heat- W74-01390 GREAT LAKES Flant Heat- W74-01390 Flant Heat- W74-013	Knox County, Tennessee, W74-01144 7C Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01379 2C Soil Association Map of Knox County, Tennessee, W74-0146 7C W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01379 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01130 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01130 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01296 7C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H International Field Year for the Great Lakes. W74-01162 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, July, 1972, W74-01130 2H Geophysical Measurements of the Thickness of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau, Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau, Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau, Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau Glacier (Geofiziche
W74-01144 Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee. W74-01146 Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01190 The Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 2C Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 W74-01380 Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 Ecophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 Areas with Abundant Sinkholes in Knox County, Tennessee, GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 International Field Year for the Great Lakes. W74-01162 Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 GREAT LAKES W74-01130 Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 GREAT LAKES GREAT LAKES Great Lakes GREAT LAKES Great Lakes W74-01130 Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 GREAT LAKES Great Lakes GREAT LAKES Great Lakes W74-01130 GREAT LAKES Field Year for the Great Lakes W74-01296 GREAT LAKES Field Year for the Great Lakes W74-01296 GREAT LAKES	the Juneau Icefield, South-Eastern Alaska, U.S.A., W74-01379 2C Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 To Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 To BOLLOGY To Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2C Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H Great Lakes W74-01162 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES To Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau) Azau), W74-01166 To Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau) W74-01160 To Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau) W74-01160 To Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau) W74-01160 To Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika M
Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee. W74-01146 To Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-0190 Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01179 Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01180 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskipe opredeleniya moshchnosti lednika Malyy Azau), W74-01190 Azau), W74-01190 Careas with Abundant Sinkholes in Knox County, Tennessee, W74-0190 GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 The Maly Azau Glacier (Geofizicheskipe tonal Field Year for the Great Lakes, W74-01296 GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 International Field Year for the Great Lakes, W74-01296 GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 The Maly Azau Glacier (Geofizicheskipe tonal Field Year for the Great Lakes, W74-01296 GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 The Maly Azau Glacier (Geofizicheskipe tonal Field Year for the Great Lakes, W74-01296 GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 The Maly Azau Glacier (Geofizicheskipe tonal Field Year for the Great Lakes, W74-01296 GREAT LAKES Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 Flat Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 Flat Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 Flat Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 Flat Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July,	Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01145 7C Soil Association Map of Knox County, Tennessee. W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C ECLOGY Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01379 2C Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01380 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 2C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H International Field Year for the Great Lakes. W74-01162 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01290 2C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H Flanned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H Flanned Data Storage Methods for the International Field Year for the Great Lakes. W74-01296 7C GREAT LAKES
Categories of Relative Feasibility for Septic-Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee. W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, Areas with Abundant Sinkholes in Knox County, Tennessee, Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01180 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy M74-01296 Azau), W74-01390 Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 International Field Year for the Great Lakes. W74-01162 Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC Coastal Processes and Beach Dynamics at Sheboygan, Wisconsin, July, 1972, W74-01130 2H International Field Year for the Great Lakes. W74-01162 2H International Field Year for the Great Lakes. W74-01162 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 7C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, July, 1972, W74-01130 2H Torrell Sheboygan, Wisconsin, July, 1972, W74-01130 2H Torrell Sheboygan, Wisconsin, July, 1972, W74-01130 2H Thermational Field Year for the Great Lakes. W74-01162 2H Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 TC GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, July, 1972, W74-01130 2H Torrell Sheboygan, Wisconsin, July, 1972, W74-01162 Torrell Sheboygan, Wisconsin, July,
Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee, W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 To W74-01130 To Geophysical Measurements, W74-01380 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, GLACIOHYDROLOGY Coastal Processes and Beach Dynamics Sheboygan, Wisconsin, July, 1972, W74-01130 International Field Year for the Great Lakes, W74-01162 GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee. W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01380 TC Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01296 TC GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, July, 1972, W74-01130 The Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01296 TC GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, July, 1972, W74-01130 The Maly Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01296 TC GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, Indiana, Michigan, Minnesota, Ohio, Wisconsin, July, 1972, W74-01162 The Maly Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01296 TC GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan
Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee. W74-01146 Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-0190 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-0190 Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-0130 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01296 GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	Tank Filter Fields in Knox County, Tennessee, W74-01145 Soil Association Map of Knox County, Tennessee. W74-01380 W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 Total Areas W14-01270 Total Calculate Areas (Problemy gidrologii led-inkov) i lednikovykh rayonov), Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01130 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01266 Total Calculate Areas (Problemy gidrologii led-inkov) i lednikovykh rayonov), GLACIOHYDROLOGY Forblems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii led-inkov) i lednikovykh rayonov), GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, July, 1972, W74-01130 2H Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01130 2H Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01130 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01296 Planned Data Storage Methods for the International Field Year for the Great Lakes. W74-0126 For Malera and Mass-Balance Measurements, W74-01162 2H For Malera and Mass-Balance Measurements, W74-01162 Planned Data Storage Methods for the International Field Year for the Great Lakes. W74-01296 For Malera and Mass-Balance Measurements, W74-01162 2H For Malera and Mass-Balance Measurements, W74-01162 For Malera and Mass-Ba
W74-01145 Soil Association Map of Knox County, Tennessee. W74-01146 W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, Glacior Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 CGREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	W74-01145 Soil Association Map of Knox County, Tennessee. W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC MORE A COOPT Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01380 2C Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 2C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC GLACIOHYDROLOGY Froblems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii lednikov) i lednikovykh rayonov), Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements, W74-01130 2H M74-01110 M74-01110 Planned Data Storage Methods for the International Field Year for the Great Lakes. W74-01296 7C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin.
Soil Association Map of Knox County, Tennessee. W74-01146 7C Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, Soil Association Map of Knox County, Tennessee, W74-01380 2C W74-01380 2C W74-01162 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01296 W74-01390 2C GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	Soil Association Map of Knox County, Tennessee. W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC MT-10166 TC Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC MT-10180 TC Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 TC MT-10180 TC Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01296 TC MT-10180 TC GEOLOGY TC GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin.
W74-01146 W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01380 2C International Field Year for the Great Lakes. W74-01162 Planned Data Storage Methods for the International Field Year for the Great Lakes. W74-01296 Planned Data Storage Methods for the International Field Year for the Great Lakes. W74-01296 GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	W74-01380 W74-01380 W74-01380 TC Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy M74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC GEOLOGY W74-01380 TC Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 TC GLACIOHYDROLOGY GLACIOHYDROLOGY Froblems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii lednikov)kh rayonov), Statismaku and Feanonic Geology of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01296 TC GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin.
W74-01146 W74-01146 TC Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01380 2C International Field Year for the Great Lakes. W74-01162 Planned Data Storage Methods for the International Field Year for the Great Lakes. W74-01296 Planned Data Storage Methods for the International Field Year for the Great Lakes. W74-01296 GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	W74-01380 W74-01380 W74-01380 TC Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy M74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC GEOLOGY W74-01380 TC Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 TC GLACIOHYDROLOGY GLACIOHYDROLOGY Froblems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii lednikov)kh rayonov), Statismaku and Feanonic Geology of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01296 TC GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin.
W74-01146 W74-01146 Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01146 Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01296 W74-01390 CGREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	W74-01146 W74-01146 TC Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01296 Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01296 TC W74-01390 TC GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin.
Mineral Resources, Geological Structure and Landform Surveys, W74-01166 Areas with Abundant Sinkholes in Knox County, Tennessee, Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01296 Azau), W74-01390 CAREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities	Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Azau), W74-01190 2C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C GLACIOHYDROLOGY Problems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii lednikov) i lednikovykh rayonov), Statispach word Fennesia Coelean of the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy W74-01296 7C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsino.
Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, The Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy Azau), W74-01390 2C GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	Mineral Resources, Geological Structure and Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C EOLOGY EOLOGY Mineral Resources, Geological Structure and the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy M74-01296 7C W74-01390 2C GLACIOHYDROLOGY Problems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii lednikov) kh rayonov), nikov i lednikovykh rayonov),
Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, GLACIOHYDROLOGY opredeleniya moshchnosti lednika Malyy W74-01296 CGREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	wyd-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C GLACIOHYDROLOGY Problems in Hydrology of Glaciers of Glacierized Areas (Problemy nikov i lednikovykh rayonov), sin. word-01270 Tennessee, Glacierized Areas (Problemy nikov i lednika Malyy tional Field Year for the Great Lakes, W74-01296 7C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin.
Landform Surveys, opredeleniya moshchnosti lednika Malyy tional Field Year for the Great Lakes, W74-01166 7C Azau), W74-01390 2C GREAT LAKES REGION 1968 Inventory of Municipal Waste Faciliti	Landform Surveys, W74-01166 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C BCOLOGY Statistics of Colors of the Great Lakes, W74-01290 TC GLACIOHYDROLOGY Froblems in Hydrology of Glaciers and Glacierized Areas (Problemy nikov i lednikovykh rayonov), Scottistics of Colors of the Great Lakes, W74-01296 7C GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin.
W74-01166 7C Azau), W74-01390 2C GREAT LAKES REGION ty, Tennessee, GLACIOHYDROLOGY 1968 Inventory of Municipal Waste Faciliti	W74-01166 7C Azau), W74-01296 7C Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 7C EOLOGY EOLOGY W74-01390 2C GLACIOHYDROLOGY Froblems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii lednikovykh rayonov), State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin.
Areas with Abundant Sinkholes in Knox County, Tennessee, GLACIOHYDROLOGY GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities	Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01390 GLACIOHYDROLOGY W74-01270 TC FORDIERS in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii led-nikov i lednikovykh rayonov), Stratisrabby and Fennesia Coolean of the services and gidrologii led-nikov i lednikovykh rayonov),
Areas with Abundant Sinkholes in Knox County, Tennessee, GLACIOHYDROLOGY GREAT LAKES REGION 1968 Inventory of Municipal Waste Facilities	Areas with Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC EOLOGY Areas With Abundant Sinkholes in Knox County, Tennessee, W74-01270 TC GLACIOHYDROLOGY Froblems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii led- nikov i lednikovykh rayonov), Stratisrably and Fennesia Coolean of the
ty, Tennessee, GLACIOHYDROLOGY 1968 Inventory of Municipal Waste Faciliti	ty, Tennessee, W74-01270 TC Froblems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii led- nikov i lednikovykh rayonov), Stratisrably and Fennesia Cooley of the
The state of the s	W74-01270 7C Problems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii led- nikov i lednikovykh rayonov), Stratisrably and Fennsia Cooley of the
	W74-01270 7C Problems in Hydrology of Glaciers and Glacierized Areas (Problemy gidrologii lednikovykh rayonov), Stratismanhy and Fernania Cooleys of the Stra
	Glacierized Areas (Problemy gidrologii led- nikov i lednikovykh rayonov),
	nikov i lednikovykh rayonov), sin.
CROLOGY	Startisanshy and Bosonsia Coolean of the
nikov i lednikovýku rayonov),	Stratigraphy and Economic Geology of the W74-01132 W74-01282
Coastal Plain of the Central Savannah River	Coastal Plain of the Central Savannah River
Area, Georgia, GRISEOFULVIN	The state of the s
W/4 01122	Ann Consideration of the Constant of the Const
	Area, Georgia, GLUCOSE GRISEOFULVIN
	Area, Georgia, W74-01122 GLUCOSE GRISEOFULVIN Determination of Griseofulvin by Time-
W74.01513	Area, Georgia, W74-01122 2J GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System. GRISEOFULVIN Determination of Griseofulvin by Time- Resolved Phosphorimetry,
Stratigraphy and Economic Geology of the	Area, Georgia, W74-01122 2J Ion-Electrode Based Automatic Glucose Analysis System, EORGIA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01213 W74-01224 5A
Coastal Plain of the Central Savannah River GONNAMA POLYMPRA	Area, Georgia, W74-01122 2J GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, Stratigraphy and Economic Geology of the GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 5A
Area Georgia	Area, Georgia, W74-01122 2J GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, Stratigraphy and Economic Geology of the Control Savannah Biver GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01513 5A CROUNDWAREA
W74 01122 Modifications in Filtration Methods for the	Area, Georgia, W74-01122 2J EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River GONYAULAX POLYEDRA GRISEOFULVIN Determination of Griseofulvin by Time- Resolved Phosphorimetry, W74-01513 5A GROYAULAX POLYEDRA
	Area, Georgia, W74-01122 2J EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 GUUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GONYAULAX POLYEDRA Modifications in Filtration Methods for the GRISEOFULVIN Determination of Griseofulvin by Time- Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater,
Measurement of Inorganic C-14 Uptake by	Area, Georgia, W74-01122 2J EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River GONYAULAX POLYEDRA GRISEOFULVIN Determination of Griseofulvin by Time- Resolved Phosphorimetry, W74-01513 5A GROYAULAX POLYEDRA
Measurement of Inorganic C-14 Uptake by Photosynthesizing Alexa	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01122 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01122 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01122 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01122 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01122 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Central Savannah River Area, Georgia, W74-01103 Eorgina Stratigraphy and Economic Geology of the Central Savannah River Area, Geor
Measurement of Inorganic C-14 Uptake by Sedimentation in a Meandering Estuary, Photosynthesizing Algae, Relationship of Pumping Lift to Economic U	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 Sedimentation in a Meandering Estuary, GUUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use
Sedimentation in a Meandering Estuary, W74-01473 W74-01475 Photosynthesizing Algae, W74-01475 Relationship of Pumping Lift to Economic U	Area, Georgia, W74-01122 2J Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 5A Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 2J Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01103 5D Relationship of Pumping Lift to Economic Use
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L W74-01425 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA Relationship of Pumping Lift to Economic Uptake by Of Groundwater for Irrigation, W74-01425	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 Area, Georgia, W74-0122 Sedimentation in a Meandering Estuary, W74-01425 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103 Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103 Area Groundwater for Irrigation, W74-01103 Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103
Sedimentation in a Meandering Estuary, W74-01473 W74-01475 Photosynthesizing Algae, W74-01475 Relationship of Pumping Lift to Economic U	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 Area, Georgia, W74-0122 Sedimentation in a Meandering Estuary, W74-01425 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103 Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103 Area Groundwater for Irrigation, W74-01103 Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103
Sedimentation in a Meandering Estuary, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Observations of Regrier Island Sediment Prohable Course for the 1977 Red Tide in the	Area, Georgia, W74-01122 2J
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets. Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Budgets. Regional Estimate of Brackish- and Sali	Area, Georgia, W74-01122 2J Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J GONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01125 Sedimentation in a Meandering Estuary, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets. GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Budgets. GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, Groundwater Yield (Regional nava otset	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 ZI Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, BUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SCHORD W74-01122 SEMINATION OF Photosynthesizing Algae, W74-01103 SONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, Groundwater Yield (Regional'nava otsenka
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-0125 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 W74-01372 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 W74-01372	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01322 SIDUEOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka)
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 2L Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 5C Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otser ekspluatatisionnykh resursov solonovatykh	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 21 GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatationnykh resursov solonovatykh i
Sedimentation in a Meandering Estuary, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L GEOTHERMAL STUDIES Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 GOVERNMENTAL INTERRELATIONS Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01435 SA Relationship of Pumping Lift to Economic Uptations, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otser ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod),	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 Sedimentation in a Meandering Estuary, W74-0117 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES GUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatationnykh resursov solonovatykh i solenykh podzemnykh vod), SCOTTERMAL STUDIES
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 5C GOVERNMENTAL INTERRELATIONS Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS GOVERNMENTAL INTERRELATIONS W74-01130 Relationship of Pumping Lift to Economic Uptake by Photosynthesizing Algae, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 J Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES GUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 AB GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01137 GEOTHERMAL STUDIES GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A Relationship of Pumping Lift to Economic Uptations of Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 Area, Georgia, W74-0122 ZI Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01233 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SAGRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SAGRICAL STUDIES GOVENDMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SAGRICAL STUDIES GOVENDMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SAGRICAL STUDIES GOVENDMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01137 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources W74-01273 GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SAROWAULAX POLYEDRA Recreational Reuse of Municipal Wastewater, W74-01103 SD GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatistonnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Using
Sedimentation in a Meandering Estuary, W74-01177 2L. Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01137 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01465 GERMANY (ELBE ESTUARY) Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming of Constrained Programming On Constr	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J GONYAULAX POLYEDRA Amodifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01465 GERISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SC GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatationnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B COVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01145 GERONYAULAX POLYEDRA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SP Relationship of Pumping Lift to Economic Use of Groundwater Yield (Regional'naya otsenka ekspluatationnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Relationships of Pumping Lift to Economic Uptake by Photosynthesizing Algae, W74-01425 GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Ustable Chance Constrained Programming is Chance Constrained Programming in the Cape Ann Region of the Gulf of Maine, W74-01435 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01165 GERMANY (ELBE ESTUARY) Relationship of Pumping Lift to Economic Uptake by Photosynthesizing Algae, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset expluatationnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Ustake Chance Constrained Programming is Signature Chance Chance Constrained Programming is Signature Chance Chance Constrained Programming Chance Chanc	Area, Georgia, W74-01122 2J Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 5A Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J GONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01103 5D Sedimentation in a Meandering Estuary, W74-01425 5D Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Eudgets, W74-01372 2L GOTHERMAL STUDIES GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01165 6ECTHERMAL STUDIES GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01465 6ERMANY (ELBE ESTUARY) 6ROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatistonykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Programming and Hydroles Simulation Programming Agreement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01125 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D Relationship of Pumping Lift to Economic Use of Groundwater For Irrigation, W74-01120 5D Relationship of Pumping Lift to Economic Use of Groundwater Yield (Regional'naya otsenka ekspluatationykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 5D Relationship of Pumping Lift to Economic Use of Groundwater For Irrigation Planning Using Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01120 5D Rel
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Relationships of Pumping Lift to Economic Upof Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otser ekspluatationnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 GERMANY (ELBE ESTUARY) Relationship of Pumping Lift to Economic Upof Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otser ekspluatationnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Uson Chance Constrained Programming in Hydrologic Simulation, Hydrologic Simulat	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 Relationships Between Turbidity and Hydro- GEADULATE COURSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation,
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Graduate Courses Related to Water Resources GRADUATE COURSES Graduate Courses Related to Water Resources Graduate Courses Related to Water Resources W74-01488 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 A Relationship of Pumping Lift to Economic Upto of Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Usto Chance Constrained Programming of Programming o	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 Sedimentation in a Meandering Estuary, W74-01122 Sedimentation in a Meandering Estuary, W74-0125 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES GEOTHERMAL STUDIES GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01465 GEOTHERMAL STUDIES GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01465 GERDUATE COURSES GRADUATE COURSES GRADUATE COURSES GRADUATE COURSES GROUNDWATER Recrecational Reuse of Municipal Wastewater, W74-01103 SCOUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 FREIGHOUS Purple of the Club and the Cape And Region of the Gulf of Maine, W74-01405 TOTAL STUDIES GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 FREIGHOUS Purple of Uptake by Thre-01513 TOTAL STUDIES GEOTHERMAL STUDIES GROUNDWA
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Relationships Between Turbidity and Brackish Water Region of the Elbe Estuary, (In German), W74-01485 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming and Hydrologic Simulation, W74-01488 GRADUATE COURSES Graduate Courses Related to Water Resources. M74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 SC GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming and Hydrologic Simulation, W74-01488	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J Sedimentation in a Meandering Estuary, W74-01122 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L COBSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01103 SERIMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01488 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01488 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01488 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01488 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01488
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01199 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01130 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming and Hydrologic Simulation, W74-01488 GRADUATE COURSES Graduate Courses Related to Water Resources. W74-0119 9A Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01125 A Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01126 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otser ekspluatatisonnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Use Chance Constrained Programming and Hydrologic Simulation, W74-01488 Regional Water Resources Studies A Span	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 Area, Georgia, W74-0122 ZI Sedimentation in a Meandering Estuary, W74-01177 Sedimentation of Net Shoreline Positions and Approximations of Net Shoreline Positions and Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 EERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01119 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-0153 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatationnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01488 4B Regional Water Resources Studies A Spanish Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka sexpluatationnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01488 A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Programming and Programming and Reuse of Municipal Wastewater, W74-01120 A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Programming and Programming and Reuse of Municipal Wastewater, W74-01120 A Hybrid Model for Irrigatio
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Relationships Algae, W74-01425 GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming and Administration, W74-01485 GRADUATE COURSES Graduate Courses Related to Water Resources. W74-01148 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset explanatasionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming and Administration, W74-01488 GRADUATE COURSES Graduate Courses Related to Water Resources. W74-01148 Regional Water Resources Studies A Span Experience,	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J GONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01233 ERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01160 GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01243 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SP GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SP Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01465 GRADUATE COURSES Graduate Courses Related to Water Resources. W74-01119 A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01188 Regional Water Resources Studies A Spanish Experience,
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 4B GERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01260 GERMINATION Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01465 6E GRADUATE COURSES Graduate Courses Related to Water Resources. W74-01119 9A GERMINATION Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01120 Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatisonnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming and Administration, W74-01488 GRADUATE COURSES Graduate Courses Related to Water Resources. W74-0119 9A GRAN PLOTS M74-0125 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming and Administration, W74-01488 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatisonnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming and Administration, W74-01488 GRADUATE COURSES GRA	Area, Georgia, W74-01122 2J EORGIA Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-0122 2J Sedimentation in a Meandering Estuary, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01435 4B ERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01260 5G ERMINATION GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-0124 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-0125 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01425 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01425 5D APA-01425 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish and Saline-Groundwater Yield (Regional Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01137 4B GRADUATE COURSES Graduate Courses Related to Water Resources. W74-0119 9A Regional Mater Resources Studies A Spanish Experience, W74-01622 4B
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L. Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01129 GERMINATION Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01165 GRADUATE COURSES Graduate Courses Related to Water Resources. W74-01119 GRAN PLOTS Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01120 Relationship of Pumping Lift to Economic U of Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatationnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming of Hydrologic Simulation, W74-01488 GRADUATE COURSES Graduate Courses Related to Water Resources. W74-01119 GRAN PLOTS M74-0125 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming of Hydrologic Simulation, W74-01488 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatationnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming of Hydrologic Simulation, W74-01488 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatationnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming of Hydrologic Simulation, W74-01488 Regional Estimate of Brackish- and Sali Groundwater Yield (Region	Area, Georgia, W74-01122 2J EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 2J Sedimentation in a Meandering Estuary, W74-01127 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 4B ERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-011260 5GRAN PLOTS GRAN PLOTS GRUUDAX FOLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-0124 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional and Administration, W74-01465 6E GRADUATE COURSES Graduate Courses Related to Water Resources. W74-0119 9A Regional Mater Resources Studies A Spanish Experience, W74-01662 4B
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01260 GERMINATION Germination Responses of a Texas Population Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming and Hydrologic Simulation, W74-01488 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming and Hydrologic Simulation, W74-01488 Regional Water Resources Hydrologic Simulation, W74-01488 Regional Materonship of Pumping Lift to Economic Unit of Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming and Hydrologic Simulation, W74-01488 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01120 GERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Resources W74-01129 GRADUATE COURSES GRADUATE COURSES Graduate Courses Related to Water Resources. W74-01488 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluat	Area, Georgia, W74-01122 2J EORGIA Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River Area, Georgia, W74-01513 5A GONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 4B EERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01119 9A GERMINATION Germination constant of the Central Savannah River Area, Georgia, W74-01120 5A GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01120 5D GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01120 4B Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatationnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01148 4B Regional Water Resources. W74-01148 4B Regional Water Resources Studies A Spanish Experience, W74-01622 4B
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01260 GERMINATION Germination Responses of a Texas Population of Ocotillo (Fouquieria splendens Engelm.) To Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-0142 by Photosynthesizing Algae, W74-01425 SA Relationship of Pumping Lift to Economic U of Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming : Hydrologic Simulation, W74-01148 GRAN PLOTS Evaluation of the Accuracy of Gran Plots by Means of Computer Calculations. Application GROVAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01125 SC GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming : Hydrologic Simulation, W74-011488 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming : Hydrologic Simulation, W74-011488 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming : Probable Causes Related to Water Resources Planning and Administration, W74-01148	Area, Georgia, W74-01122 2J EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01513 Sedimentation in a Meandering Estuary, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01260 GROYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-0125 GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01465 GRADUATE COURSES Graduate Courses Related to Water Resources. W74-0119 GRAN PLOTS EVALUATE COURSES Graduate Courses Related to Water Resources. W74-0119 Approximation Responses of a Texas Population of Computer Calculations. Application GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01124 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatisonnykh resursov solonovatykh is solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01189 A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation, W74-01622 4B CROUNDWATER ALLOCATION GRAN PLOTS Evaluation of the Accuracy of Gran Plots by Means of Computer Calculations. Application GROUNDWATER ALLOCATION
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 4B GERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01129 GERMINATION Germination Responses of a Texas Population of Ocotillo (Fouquieria splendens Engelm.) To Constant Temperature, Water Stress, pH and	Area, Georgia, W74-01122 2J EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J Sedimentation in a Meandering Estuary, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 4B ERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01166 5B ERMINATION Germination Responses of a Texas Population of Ocolillo (Fougieria splendens Engelm.) To Constant Temperature, Water Stress, pH and to Constant Temperature, Water
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01260 GERMINATION Germination Responses of a Texas Population of Ocotillo (Fouquieria splendens Engelm.) To Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-0142 by Photosynthesizing Algae, W74-01425 SA Relationship of Pumping Lift to Economic U of Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming : Hydrologic Simulation, W74-01148 GRAN PLOTS Evaluation of the Accuracy of Gran Plots by Means of Computer Calculations. Application GROVAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01125 SC GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming : Hydrologic Simulation, W74-011488 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming : Hydrologic Simulation, W74-011488 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming : Probable Causes Related to Water Resources Planning and Administration, W74-01148	Area, Georgia, W74-01122 2J Scrintigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J Sedimentation in a Meandering Estuary, W74-01127 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L SCONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 SCOVENMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01260 SERMINATION Germination Responses of a Texas Population of Ocotillo (Fouquieria splendens Engelm.) To Constant Temperature, Water Stress, pH and Salinity, W74-01620 STONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01260 SONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 SCOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01260 SERMINATION Germination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SAGROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline- Groundwater Yield (Regional'naya otsenka ekspluatationnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B Region of the Elbe Estuary, (In German), W74-01260 SB REMINATION Germination Responses of a Texas Population of the Gulf of Maine, W74-01279 SCOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources. W74-01190 SCOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources. W74-01103 SPA-01120 SPA
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	Area, Georgia, GLUCOSE GRISEOFULVIN
sis System Resolved Phosphorimetry,	Area, Georgia, W74-01122 GLUCOSE GRISEOFULVIN Determination of Griseofulvin by Time-
GEORGIA W74 01224	Area, Georgia, W74-01122 2J GLUCOSE Ion-Electrode Based Automatic Glucose Analy- air System GRISEOFULVIN Determination of Griseofulvin by Time- Resolved Phosphorimetry.
Stratigraphy and Economic Geology of the W74-01513	Area, Georgia, W74-01122 2J GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74.0124
	Area, Georgia, W74-01122 2J Ion-Electrode Based Automatic Glucose Analysis System, EORGIA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01213 W74-01224 5A
Coastal Plain of the Central Savannah River GONNAULAN POLYMPRA	Area, Georgia, W74-01122 2J GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 5A GRISEOFULVIN GRISEOFULVIN Determination of Griseofulvin by Time- Resolved Phosphorimetry, W74-01224 5A
Area Georgia	Area, Georgia, W74-01122 2J GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, Stratigraphy and Economic Geology of the Control Savananh Biver GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01513 5A CROCUMPINATER
W74 01122 Modifications in Filtration Methods for the	Area, Georgia, W74-01122 2J EORGIA Stratigraphy and Economic Geology of the Constal Plain of the Central Savannah River GONYAULAX POLYEDRA GRISEOFULVIN Determination of Griseofulvin by Time- Resolved Phosphorimetry, W74-01513 5A GONYAULAX POLYEDRA GRISEOFULVIN Determination of Griseofulvin by Time- Resolved Phosphorimetry, W74-01224 5A GONYAULAX POLYEDRA
	Area, Georgia, W74-01122 2J EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 GUUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GONYAULAX POLYEDRA Modifications in Filtration Methods for the GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater,
Measurement of Inorganic C-14 Uptake by	Area, Georgia, W74-01122 2J EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J GONYAULAX POLYEDRA Modifications in Filtration Methods for the W74-01122 Area, Georgia, W74-01123 Area, Georgia, W74-01123 Area, Georgia, W74-01124
Measurement of Inorganic C-14 Uptake by	Area, Georgia, W74-01122 2J GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 5A Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 5A SAVINDAMENTAL SOLUTION STATES AND
Measurement of Inorganic C-14 Uptake by Photosynthesizing Alexa	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Contral Savannah River Area, Georgia, W74-01122 EORYA-ULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Sedimentation in Methods for the Measurement of Inorganic C-14 Uptake by GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D
Sedimentation in a Meandering Estuary, W74-01473 W74-01475 Photosynthesizing Algae, W74-01475 Relationship of Pumping Lift to Economic U	Area, Georgia, W74-01122 2J Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 5A Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 2J GONYAULAX POLYEDRA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01122 Sedimentation in a Meandering Estuary, W74-01427 Sedimentation in a Meandering Estuary, W74-01427 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA W74-01224 GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use
Sedimentation in a Meandering Estuary, W74-01473 W74-01475 Photosynthesizing Algae, W74-01475 Relationship of Pumping Lift to Economic U	Area, Georgia, W74-01122 2J Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 5A Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 2J GONYAULAX POLYEDRA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01122 Sedimentation in a Meandering Estuary, W74-01427 Sedimentation in a Meandering Estuary, W74-01427 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA W74-01224 GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use
Sedimentation in a Meandering Estuary, W74-01177 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA Relationship of Pumping Lift to Economic Uptake by Of Groundwater for Irrigation,	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 GUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 Solvential Savannah River Area, Georgia, W74-01513 GONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01103 GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SAW-74-01513 GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Sedimentation in a Meandering Estuary, W74-01425 SAW-74-01425 SAW-74-01425 GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SAW-74-01224 SAW-74-01224 SRECREATIONAL RESOLVED RA Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation,
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L W74-01425 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA Relationship of Pumping Lift to Economic Uptake by Of Groundwater for Irrigation, W74-01425	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 Area, Georgia, W74-0122 Sedimentation in a Meandering Estuary, W74-01425 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103 Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103 Area Groundwater for Irrigation, W74-01103 Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L W74-01425 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA Relationship of Pumping Lift to Economic Uptake by Of Groundwater for Irrigation, W74-01425	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 Area, Georgia, W74-0122 Sedimentation in a Meandering Estuary, W74-01425 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103 Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103 Area Groundwater for Irrigation, W74-01103 Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01103
Measurement of Inorganic C-14 Uptake by Sedimentation in a Meandering Estuary, W74-01177 2L Observations of Net Shoreline Positions and Observations of Net Shoreline Positions and GONYAULAX TAMARENSIS Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS W74-01120 Relationship of Pumping Lift to Economic Uptake by Photosynthesizing Algae, W74-01120	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J GONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 Observations of Net Shoreline Positions and GONYAULAX TAMARENSIS GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B
Sedimentation in a Meandering Estuary, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Observations of Regrier Island Sediment Prohable Course for the 1977 Red Tide in the	Area, Georgia, W74-01122 2J
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Regional Estimate of Brackish- and Sali	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets. Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Budgets. Regional Estimate of Brackish- and Sali	Area, Georgia, W74-01122 2J Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J GONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01125 Sedimentation in a Meandering Estuary, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets. GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Budgets. GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, Groundwater Yield (Regional nava otset	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 ZI Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, BUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SCHORD W74-01122 SEMINATION OF Photosynthesizing Algae, W74-01103 SONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, Groundwater Yield (Regional'nava otsenka
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-0125 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 W74-01372 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 W74-01372	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 Sedimentation in a Meandering Estuary, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01322 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 Observations of Net Shoreline Positions and CONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-011379 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Cape Ann Region of the Gulf of Maine, W74-01379 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Cape Ann Region of the Gulf of Maine, W74-01120 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Cape Ann Region of the Gulf of Maine, W74-01120 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Cape Ann Region of the Gulf of Maine, W74-01120 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Cape Ann Region of the Gulf of Maine, W74-01120 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Cape Ann Region of the Gulf of Maine, W74-01120 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Cape Ann Region of the Gulf of Maine, W74-01120 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Cape Ann Region of the Gulf of Maine, W74-01120 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Cape Ann Region of the Gulf of Maine, W74-01120 Observations of Net Shoreline Positions and Observations of Barrier Island Sediment Cape Ann Region of the Gulf of Maine, W74-01120 Observations of Net Shoreline Positions and Observation Cape Ann Region of the Gulf of Maine, W74-01120 Observation Cape Ann Region of	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 CI COSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01103 SCONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01103 SCONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01120 Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh in the Cape Ann Region of the Gulf of Maine, W74-01372 Control of Control of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SCONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01120 Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SCONYAULAX TAMARENSIS Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh in the Cape Ann Region of the Gulf of Maine, W74-01372
Sedimentation in a Meandering Estuary, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L GEOTHERMAL STUDIES Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 GOVERNMENTAL INTERPRELATIONS Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GOVERNMENTAL INTERPRELATIONS Relationship of Pumping Lift to Economic Uptake by Photosynthesizing Algae, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otser ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod),	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES GUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatistonnykh resursov solonovatykh i solenykh podzemnykh vod),
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 5C GOVERNMENTAL INTERRELATIONS Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS GOVERNMENTAL INTERRELATIONS W74-01130 Relationship of Pumping Lift to Economic Uptake by Photosynthesizing Algae, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 J Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES GUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SGROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 AB GOVERNMENTAL INTERRELATIONS
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 5C GOVERNMENTAL INTERRELATIONS Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS GOVERNMENTAL INTERRELATIONS W74-01130 Relationship of Pumping Lift to Economic Uptake by Photosynthesizing Algae, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 J Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES GUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SGROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 AB GOVERNMENTAL INTERRELATIONS
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, GOVERNMENTAL INTERRELATIONS Geothermal Resource Investigations, And Not a Drop to Drink: Water Resources Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01130 Relationship of Pumping Lift to Economic Uptations of Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otser ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-0128 GIUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatistonnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 And Not a Drop to Drink: Water Resources
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01137 GEOTHERMAL STUDIES GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A Relationship of Pumping Lift to Economic Uptations of Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 ZI Sedimentation in a Meandering Estuary, W74-01177 Sedimentation of Net Shoreline Positions and Approximations of Net Shoreline Positions and Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01233 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka chespluatationnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01137 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatisionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Us	Area, Georgia, W74-01122 2J Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 5A Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J GONYAULAX POLYEDRA Modifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 2L COSE MY4-01372 2L EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources W74-01137 GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01137 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 Sedimentation in a Meandering Estuary, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatistonnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Using
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01137 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 Sedimentation in a Meandering Estuary, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatistonnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Using
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01137 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-0122 Sedimentation in a Meandering Estuary, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatistonnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Using
Sedimentation in a Meandering Estuary, W74-01177 2L. Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01137 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01465 GERMANY (ELBE ESTUARY) Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming of Constrained Programming On Constr	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 AB GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B COVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01465 A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and
Sedimentation in a Meandering Estuary, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming 15	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 21 GONYAULAX POLYEDRA Amodifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 Sedimentation in a Meandering Estuary, W74-01425 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 21 GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Anna Region of the Gulf of Maine, W74-01435 GOOVERNMENTAL INTERRELATIONS Geothermal Resource Investigations, W74-01273 4B GEMANY (ELBE ESTUARY) GRISEOFULVIN Determination of Griseofulvin by Time-Resolveds Analysis System, W74-01513 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and
Sedimentation in a Meandering Estuary, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming 15	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 21 GONYAULAX POLYEDRA Amodifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 Sedimentation in a Meandering Estuary, W74-01425 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 21 GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Anna Region of the Gulf of Maine, W74-01435 GOOVERNMENTAL INTERRELATIONS Geothermal Resource Investigations, W74-01273 4B GEMANY (ELBE ESTUARY) GRISEOFULVIN Determination of Griseofulvin by Time-Resolveds Analysis System, W74-01513 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and
Sedimentation in a Meandering Estuary, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01137 A Hybrid Model for Irrigation Planning Us Chance Constrained Programming 15	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 21 GONYAULAX POLYEDRA Amodifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 Sedimentation in a Meandering Estuary, W74-01425 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 21 GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Anna Region of the Gulf of Maine, W74-01435 GOOVERNMENTAL INTERRELATIONS Geothermal Resource Investigations, W74-01273 4B GEMANY (ELBE ESTUARY) GRISEOFULVIN Determination of Griseofulvin by Time-Resolveds Analysis System, W74-01513 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and
Sedimentation in a Meandering Estuary, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01273 GERMANY (ELBE ESTUARY) Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Planning and Administration, W74-01465 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA Relationship of Pumping Lift to Economic Uptation of Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatisionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137 A Hybrid Model for Irrigation Planning Ustaning Ustanin	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 21 GONYAULAX POLYEDRA Amodifications in Filtration Methods for the Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 Sedimentation in a Meandering Estuary, W74-01425 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 21 GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Anna Region of the Gulf of Maine, W74-01435 GOOVERNMENTAL INTERRELATIONS Geothermal Resource Investigations, W74-01273 4B GEMANY (ELBE ESTUARY) GRISEOFULVIN Determination of Griseofulvin by Time-Resolveds Analysis System, W74-01513 5A GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 5D Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and
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Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Geothermal Resource Investigations, W74-01372 Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 SC GOVERNMENTAL INTERRELATIONS And Not a Drop to Drink: Water Resources Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA Relationship of Pumping Lift to Economic Uptation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatationnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 Sedimentation in a Meandering Estuary, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES Geothermal Resource Investigations, W74-0128 GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatisonnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 And Not a Drop to Drink: Water Resources
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 SC GOVERNMENTAL INTERRELATIONS Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 SA Relationship of Pumping Lift to Economic Uptake of Groundwater for Irrigation, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 J Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 AB GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 5C GOVERNMENTAL INTERRELATIONS Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS GOVERNMENTAL INTERRELATIONS W74-01130 Relationship of Pumping Lift to Economic Uptake by Photosynthesizing Algae, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 J Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 AB GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137
Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01177 2L Observations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 GEOTHERMAL STUDIES Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01372 5C GOVERNMENTAL INTERRELATIONS Measurement of Inorganic C-14 Uptake by Photosynthesizing Algae, W74-01425 5A GONYAULAX TAMARENSIS Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01135 GOVERNMENTAL INTERRELATIONS GOVERNMENTAL INTERRELATIONS W74-01130 Relationship of Pumping Lift to Economic Uptake by Photosynthesizing Algae, W74-01120 Regional Estimate of Brackish- and Sali Groundwater Yield (Regional'naya otset ekspluatatsionnykh resursov solonovatykh solenykh podzemnykh vod), W74-01137	Area, Georgia, W74-01122 EORGIA Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 J Sedimentation in a Meandering Estuary, W74-01177 Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediment Budgets, W74-01372 EOTHERMAL STUDIES GLUCOSE Ion-Electrode Based Automatic Glucose Analysis System, W74-01513 SA GRISEOFULVIN Determination of Griseofulvin by Time-Resolved Phosphorimetry, W74-01224 SA GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 AB GROUNDWATER Recreational Reuse of Municipal Wastewater, W74-01103 SD Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation, W74-01120 4B Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137

GROUNDWATER BASINS	GROWTH STAGES	HEATED GRAPHITE ATOMIZER
Balance Estimate of Groundwater Resources	Emergence, Reproduction, and Growth of	Evaluation of the Use of the Heated Graphite
on the Northwestern Slope of the Caucasus	Setipalpian Plecoptera in Southern Ontario,	Atomizer for the Routine Determination of
(Balansovaya otsenka resursov podzemnykh	W74-01359 5A	Trace Metals in Water,
vod severo-zapadnogo sklona Bol'shogo Kav-	GROWTH STUDIES	W74-01316 5A
kaza), W74-01136 4B	Studies on Methanol-Oxidizing Bacteria. I.	HEATED WATER
W /4-01136	Isolation and Growth Studies,	Field and Experimental Studies on the Effects
On the Optimal Operation of Groundwater	W74-01535 5C	of a Power Station Effluent on Tubificidae
Basins: A Calculus of Variations Approach,		(Oligochaeta, Annelida),
W74-01489 4B	GUAM	W74-01312 5C
CROUNDWATER MINING	Algal Succession on Artificial Reefs in a	
GROUNDWATER MINING	Marine Lagoon Environment in Guam,	HEAVY METALS
On the Optimal Operation of Groundwater Basins: A Calculus of Variations Approach,	W74-01429 5C	Holbrook Cove Survey-A 1972 Student
W74-01489 4B	GULF OF MAINE	Summer Ocean Engineering Laboratory
17	Probable Causes for the 1972 Red Tide in the	Research Project.
GROUNDWATER MOVEMENT	Cape Ann Region of the Gulf of Maine,	W74-01131 5B
Reservoir Mechanism in an Aquifer of Arbitra-	W74-01435 5C	
ry Boundary Shape,		Investigations on the Changes in the Content of
W74-01129 2F	GULF OF ST. LAWRENCE	Heavy Metals in Lake Waters of the Masurian
Drawdown at Time-Dependent Flowrate,	Variation of Organochlorine Residue Levels	Lake District,
W74-01155 2F	with Age in Gulf of St. Lawrence Harp Seals	W74-01221 5B
W/4-01135 2F	(Pagophilus Groenlandicus),	Evaluation of the Use of the Heated Graphite
A Distributed Hydrological Model Based on the	W74-01300 5A	Atomizer for the Routine Determination of
Concept of Groundwater Recharge, Transmis-	HALISCOMENOBACTER HYDROSSIS	Trace Metals in Water,
sion, and Discharge,	Investigations on the Sheathed Bacterium	W74-01316 5A
W74-01233 2F	Haliscomenobacter hydrossis Gen.n., Sp.n.,	5A
	Isolated from Activated Sludge,	Heavy Metals in Wastewater and Treatment
Numerical Solution of Multiphase Well Flow,	W74-01539 5B	Plant Effluents,
W74-01275 8B		W74-01319 5A
GROUNDWATER RECHARGE	HALOCINE	
A Distributed Hydrological Model Based on the	On Structure, Entrainment, and Transport in	The Importance of Chelating Agents in Natural
Concept of Groundwater Recharge, Transmis-	Estuarine Embayments,	Waters and Wastewaters,
sion, and Discharge,	W74-01178 2L	W74-01326 5B
W74-01233 2F	HARBORS	
	Harbor Analog System, Part I - Waves,	Critical Study of the APCD-MIBK Extraction
GROUNDWATER RESOURCES	W74-01200 2L	System for Atomic Absorption,
Balance Estimate of Groundwater Resources	W/4-01200 2L	W74-01329 5A
on the Northwestern Slope of the Caucasus	Ocean Utilization and Coastal Zone Develop-	New Detector for Ion-Exchange Chromatog-
(Balansovaya otsenka resursov podzemnykh	ment.	raphy,
vod severo-zapadnogo sklona Bol'shogo Kav- kaza),	W74-01281 2L	W74-01343 5A
W74-01136 4B	01 01-1 Maria (Auto- ta Balata	3A
	Sierra Club v. Mason (Action to Enjoin	Simultaneous Determination of Manganese,
Ground-Water Yield Potential in Knox County,	Dredging of New Haven Harbor). W74-01456 6E	Copper, Arsenic, Cadmium, Antimony and
Tennessee,	W/4-01436 6E	Mercury in Glacial Ice by Radioactivation,
W74-01147 7C	HARDWOOD FORESTS	W74-01361 5A
Murfee v Phillips Petroleum Company (Action	Die-Back in the Mixed Hardwood Forests of	
Murfee v. Phillips Petroleum Company (Action	Die-Back in the Mixed Hardwood Forests of Eastern Victoria: A Preliminary Report,	Uptake of Methyl Mercuric Chloride and Mer-
by Property Owners Against Oil and Gas Les-		curic Chloride by Trout: A Study of Uptake
by Property Owners Against Oil and Gas Les- sees for Diminution of Market Value of Land	Eastern Victoria: A Preliminary Report, W74-01251 4A	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake
by Property Owners Against Oil and Gas Les- sees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water	Eastern Victoria: A Preliminary Report, W74-01251 4A HARP SEALS	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro,
by Property Owners Against Oil and Gas Les- sees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply).	Eastern Victoria: A Preliminary Report, W74-01251 4A HARP SEALS Variation of Organochlorine Residue Levels	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake
by Property Owners Against Oil and Gas Les- sees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E	Eastern Victoria: A Preliminary Report, W74-01251 4A HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412
by Property Owners Against Oil and Gas Les- sees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus),	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 5C Relation Between Total Body Weight and Con-
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and	Eastern Victoria: A Preliminary Report, W74-01251 4A HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 5C Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc,
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum,	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 5C Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po-
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A HARVESTS	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 5C Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum, W74-01422 5C	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish Antimora Rostrata,
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum, W74-01422 5C Some Thoughts on Nutrient Limitation in Al-	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A HARVESTS Two Harvest of Cereal Crops per Year with Ir-	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 5C Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum, W74-01422 5C Some Thoughts on Nutrient Limitation in Algae,	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A HARVESTS Two Harvest of Cereal Crops per Year with Irrigation, (In Russian), W74-01202 3F	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish Antimora Rostrata,
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum, W74-01422 5C Some Thoughts on Nutrient Limitation in Algae, W74-01428 5C	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A HARVESTS Two Harvest of Cereal Crops per Year with Irrigation, (In Russian), W74-01202 3F HAWAII	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 SC Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish Antimora Rostrata, W74-01413 SB
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum, W74-01422 5C Some Thoughts on Nutrient Limitation in Algae, W74-01428 5C Kinetics of Silicon-Limited Growth in the	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A HARVESTS Two Harvest of Cereal Crops per Year with Irrigation, (In Russian), W74-01202 3F HAWAII New Records of Sargassum Hawaiiensis Doty	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 SC Relation Between Total Body Weight and Concentrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish Antimora Rostrata, W74-01413 SB Growth Rates of Sediment-Living Marine
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum, W74-01422 5C Some Thoughts on Nutrient Limitation in Algae, W74-01428 5C Kinetics of Silicon-Limited Growth in the Marine Diatom Thalassiosira pseudonana Hasle	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A HARVESTS Two Harvest of Cereal Crops per Year with Irrigation, (In Russian), W74-01202 3F HAWAII New Records of Sargassum Hawaiiensis Doty and Newhouse (Sargassaceae, Phaeophyta), a	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish Antimora Rostrata, W74-01413 5B Growth Rates of Sediment-Living Marine Protozoan as a Toxicity Indicator for Heavy
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum, W74-01422 5C Some Thoughts on Nutrient Limitation in Algae, W74-01428 5C Kinetics of Silicon-Limited Growth in the Marine Diatom Thalassiosira pseudonana Hasle and Heimdal (Equals Cyclotella Nana Hustedt),	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A HARVESTS Two Harvest of Cereal Crops per Year with Irrigation, (In Russian), W74-01202 3F HAWAII New Records of Sargassum Hawaiiensis Doty and Newhouse (Sargassaceae, Phaeophyta), a Deep Water Species,	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 SC Relation Between Total Body Weight and Concentrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish Antimora Rostrata, W74-01413 SB Growth Rates of Sediment-Living Marine Protozoan as a Toxicity Indicator for Heavy Metals, W74-01529 SA
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum, W74-01422 5C Some Thoughts on Nutrient Limitation in Algae, W74-01428 5C Kinetics of Silicon-Limited Growth in the Marine Diatom Thalassiosira pseudonana Hasle	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A HARVESTS Two Harvest of Cereal Crops per Year with Irrigation, (In Russian), W74-01202 3F HAWAII New Records of Sargassum Hawaiiensis Doty and Newhouse (Sargassaceae, Phaeophyta), a	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 5C Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish Antimora Rostrata, W74-01413 5B Growth Rates of Sediment-Living Marine Protozoan as a Toxicity Indicator for Heavy Metals, W74-01529 5A HELIUM
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum, W74-01422 5C Some Thoughts on Nutrient Limitation in Algae, W74-01428 5C Kinetics of Silicon-Limited Growth in the Marine Diatom Thalassiosira pseudonana Hasle and Heimdal (Equals Cyclotella Nana Hustedt),	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A HARVESTS Two Harvest of Cereal Crops per Year with Irrigation, (In Russian), W74-01202 3F HAWAII New Records of Sargassum Hawaiiensis Doty and Newhouse (Sargassaceae, Phaeophyta), a Deep Water Species,	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 5C Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish Antimora Rostrata, W74-01413 5B Growth Rates of Sediment-Living Marine Protozoan as a Toxicity Indicator for Heavy Metals, W74-01529 5A HELIUM Isotopic Composition of Helium in Thermal
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum, W74-01422 5C Some Thoughts on Nutrient Limitation in Algae, W74-01428 5C Kinetics of Silicon-Limited Growth in the Marine Diatom Thalassiosira pseudonana Hasle and Heimdal (Equals Cyclotella Nana Hustedt), W74-01431 5C	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A HARVESTS Two Harvest of Cereal Crops per Year with Irrigation, (In Russian), W74-01202 3F HAWAII New Records of Sargassum Hawaiiensis Doty and Newhouse (Sargassaceae, Phaeophyta), a Deep Water Species, W74-01349 21	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 5C Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish Antimora Rostrata, W74-01413 5B Growth Rates of Sediment-Living Marine Protozoan as a Toxicity Indicator for Heavy Metals, W74-01529 5A HELIUM Isotopic Composition of Helium in Thermal Springs of Iceland (Izotopnyy sostav geliya ter-
by Property Owners Against Oil and Gas Lessees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water Supply). W74-01459 6E GROWTH RATES The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum, W74-01422 5C Some Thoughts on Nutrient Limitation in Algae, W74-01428 5C Kinetics of Silicon-Limited Growth in the Marine Diatom Thalassiosira pseudonana Hasle and Heimdal (Equals Cyclotella Nana Hustedt), W74-01431 5C Growth Rates of Intertidal Molluscs as Indica-	Eastern Victoria: A Preliminary Report, W74-01251 HARP SEALS Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals (Pagophilus Groenlandicus), W74-01300 5A HARVESTS Two Harvest of Cereal Crops per Year with Irrigation, (In Russian), W74-01202 3F HAWAII New Records of Sargassum Hawaiiensis Doty and Newhouse (Sargassaceae, Phaeophyta), a Deep Water Species, W74-01349 11 HEAT BALANCE	curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro, W74-01412 5C Relation Between Total Body Weight and Con- centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po- matomus saltatrix) and A Bathyl-Dimersal Fish Antimora Rostrata, W74-01413 5B Growth Rates of Sediment-Living Marine Protozoan as a Toxicity Indicator for Heavy Metals, W74-01529 5A HELIUM Isotopic Composition of Helium in Thermal

W74-01380

5C

Growth Rates of Sediment-Living Marine
Protozoan as a Toxicity Indicator for Heavy
Metals,
W74-01529

SA

HEAT RESISTANCE
Thermophilic Ostracod: Aquatic Metazoan with the Highest Known Temperature Tolerance,
W74-01327

5C

5C

HERBICDIES

Effects of Paraquat on Invertebrates in a Can-tebury Stream, New Zealand, W74-01298 5C

HETEROTROPHIC BACTERIA

Silica Gel Medium for Enumeration of Petrole-	(Forstell) Feldmann et Hamel,	Behavioral Responses to Changes in Hydro-
umlytic Microorganisms in the Marine Environ- ment,	W74-01424 5C	static Pressure and Light During Larval Development of the Lobster Homarus Gam-
W74-01532 5A	HYDROGEN SULFIDE	marus,
HOGS	Swimming Endurance and Resistance to	W74-01436 5C
Collaborative Study of a Colorimetric Method	Copper and Malathion of Bluegills Treated by Long-Term Exposure to Sublethal Levels of	HYDROXYBENZOTRIFLUORIDE
for Determining Arsenic Residues in Red Meat	Hydrogen Sulfide,	Thermodynamics of Acid-Base Equilibria. II
and Poultry,	W74-01579 5C	Ionization of m- and p-Hydrox
W74-01403 5A		ybenzotrifluoride and the Concept of Fluorine
HOLBROOK COVE (ME)	HYDROGEOLOGY	Double Bond-No Bond Resonance,
Holbrook Cove SurveyA 1972 Student	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South	W74-01226 2K
Summer Ocean Engineering Laboratory	Platte River Valley, Colorado,	ICE COVER
Research Project.	W74-01142 4B	Seasonal Variation of Chemical Parameters in
W74-01131 5B		Alaskan Tundra Lakes,
TOLOPERUM CIRRERING FARRACH	Ground-Water Yield Potential in Knox County,	W74-01347 5E
The Distribution, Composition and Biomass of	Tennessee, W74-01147 7C	ICEBERGS
the Crustacean Zooplankton Population in	W74-01147 7C	Icebergs as a Fresh-Water Source: An Ap
Western Lake Superior,	Sensitivity of Groundwater flow Models to	praisal,
W74-01109 5C	Vertical Variability of Aquifer Constants,	W74-01375 20
THE COLUMN THE COLUMN	W74-01151 4B	Too Colorina into the Possilarial Commenter I also
HUDSON BAY BASIN	HVDBOOD ABIL ANAL VOIC	Ice Calving into the Proglacial Generator Lake
Quality of Surface Waters of the United States,	HYDROGRAPH ANALYSIS Hydrograph Simulation Models of the Hill-	Baffin Island, N.W.T., Canada, W74-01376 20
1968: Parts 4 and 5. St Lawrence River Basin and Hudson Bay and Upper Mississippi River	sborough and Alafia Rivers, Florida: A Prelimi-	W 74-01370
Basins.	nary Report,	ICELAND
W74-01268 2K	W74-01611 4A	Reservoir Mechanism in an Aquifer of Arbitra
		ry Boundary Shape,
HUMAN DISEASES	HYDROGRAPHY	W74-01129 21
Metabolic Effects of Drinking Brackish Water,	Experiments and Hydrographic Surveys Off	Isotopic Composition of Helium in Therma
W74-01632 5C	Sandy Hook, New Jersey (1963), W74-01199 2L	Springs of Iceland (Izotopnyy sostav geliya ter
HUMAN POPULATION	#/4-01139 2L	mal'nykh istochnikov Islandii),
Surface-Water Resources of the USSR and	HYDROLOGIC DATA	W74-01396 2N
Their Change Resulting from Human Economic	Near Real Time Water Resources Data for	IDAHO
Activity (Resursy poverkhnostnykh vod SSSR i	River Basin Management,	Report of Attitudes and Opinions of Recrea
ikh izmeneniye pod vliyaniyem khozyaystven-	W74-01150 4A	tionists Towards Wild and Scenic Rivers:
noy deyatel'nosti),	International Field Year for the Great Lakes.	Case Study of the St. Joe River,
W74-01133 4A	W74-01162 2H	W74-01102 6F
HUMIC COMPOUNDS	W/4-01102	Balatianskia of Dumains Life to Passamia Ha
Molecule-Size Distribution of Soluble Humic	Storage and Retrieval of Groundwater Data,	Relationship of Pumping Lift to Economic Use of Groundwater for Irrigation,
Compounds From Different Natural Waters,	W74-01291 7C	W74-01120 4
W74-01351 2H	Storage and Processing of Water Quality Data,	
HUMIDITY	W74-01293 7C	Simulating the Behavior of a Multi-Unit, Multi
The Effect of Substrate Humidity on the	70	Purpose Water-Resource System,
Supply of Macroelements to Plants, (In Latvi-	Computer Utilization of Hydrological Data for	W74-01468 6/
an),	North Nashwanksis Representative Basin,	ILLINOIS
W74-01241 3F	W74-01294 7C	Water Quality Evaluation of Regionalized
HYDRAULIC PROPERTIES	Hydrological Information for the Planning of	Wastewater Systems,
Effect of Portland Cement on Soil Aggregation	Water Resources in Developing Countries (L-	W74-01107 5I
and Hydraulic Properties,	'Information Hydrologique Pour La Planifica-	City of Monmouth V. Environmental Protect
W74-01576 2G	tion des Resources Hydrauliques Dans Les	tion Agency (EPA Sued the City to Prohibit the
	Pays en Voie de Developpement),	City from Continuing to Maintain a Sewag
HYDROBIOLOGICAL STUDIES	W74-01623 7C	Lagoon System Which was Emitting Noxiou
Hydrobiological Studies on the Lednicke Ryb- niky Ponds: Species Composition and Seasonal	Hydrologic Engineering Methods for Water	Odors).
Variation in the Abundance of Plankton (In	Resources Development. Volume 2. Hydrologic	W74-01462 61
Czech),	Data Management,	Comprehensive Water and Sewer Plan, Ran
W74-01567 5C	W74-01642 2E	dolph County, Illinois.
	HUDDOLOGICAL MODELS	W74-01474 51
HYDROELECTRIC PLANTS	HYDROLOGICAL MODELS A Distributed Hydrological Model Based on the	Political Company of the Company of
Supersaturation of Nitrogen in Water During Passage Through Hydroelectric Turbines at	Concept of Groundwater Recharge, Transmis-	Early Thoughts on Prosecuting Polluters, W74-01613
Mactaquac Dam,	sion, and Discharge,	W74-01613 50
W74-01432 5C	W74-01233 2F	A Bill Authorizing the State of Illinois and th
		Metropolitan Sanitary District of Greate
HYDROGEN ION CONCENTRATION	HYDROLYSIS	Chicago to Increase the Diversion of Wate
Protozoa from Blue Lake, Raoul Island,	Ethylenethiourea Degradation,	from Lake Michigan into the Illinois Waterway
W74-01310 5C	W74-01340 5B	W74-01618 61
Diatom Flora of the Grand River, Ontario,	Thermal and Base-Catalyzed Hydrolysis	IMPERIAL VALLEY (CALIF)
Canada,	Products of the Systemic Fungicide, Benomyl,	Geothermal Resource Investigations,

INDIA (GUJARAT)	INSECTICIDES	The Effect of China-Clay Wastes on Stream In-
Economics of Resource Use on Sample Farms	Gas-Liquid Chromatographic Determination of	vertebrates,
of Central Gujarat,	Chlorpyriphos in Dursban Insecticide Formula-	W74-01527 5C
W74-01491 3F	tions,	ION EXCHANGE
PURIS (GURGA ON DICTRICT)	W74-01405 5A	Salinity Adaptation by Dunaliella Tertiolecta. I.
INDIA (GURGAON DISTRICT) Effect of the Quality of Well Waters on Soils in	INSTITUTIONAL CONSTRAINTS	Increases in Carbonic Anhydrase Activity and
Gurgaon District,	Consolidation of Irrigation Systems: Phase 1,	Evidence for a Light-Dependent Na (Plus)/H
W74-01252 2G	Engineering, Legal, and Sociological Con-	(Plus) Exchange,
W/4-01232 2G	straints and/or Facilitators.	W74-01427 5C
INDIA (KASHMIR)	W74-01367 3F	
A First Record of Red-Water Phenomenon in	4770307	ION EXCHANGE CHROMATOGRAPHY
Kashmir, India,	Physical System Modelling as a Tool in Water	New Detector for Ion-Exchange Chromatog-
W74-01564 5C	Resource Planning,	raphy,
	W74-01487 2A	W74-01343 5A
INDIA (KORBA-M.P.)		
The Characteristics of the Raw Waters of	INSTREAM AERATION	Fluorometric Quantitation of Gallium in Biolog-
Hasdeo River and Dhengur Nala at Korba (M.	Mobile Oxygen Dispersion Craft,	ical Materials at Nanogram Levels,
P.),	W74-01232 5G	W74-01344 2K
W74-01240 5A	INCERTIMENTA TION	An Automated Mathed for the Destamination
	INSTRUMENTATION	An Automated Method for the Dertemination
INDIANA	Comparison of the Snow Resistograph with the	of Trace Amounts of Metal Ions by Ion-
Operation of Watercraft.	Ram Penetrometer,	Exchange Chromatography. Determination of
W74-01455 6E	W74-01381 2C	zinc (II) in Waters,
PURIOR OFFICE AND ADDRESS OF THE PROPERTY OF T	Small-Volume Solid-Electrode Flow-Through	W74-01438 5A
INDUCED OXYGENATION	Electrochemical Cells. Preliminary Evaluation	ION PAIR PARTITION CHROMATOGRAPHY
Mobile Oxygen Dispersion Craft,	Using Pulse Polarographic Techniques,	Ion Pair Partition Chromatography of Organic
W74-01232 5G	W74-01445 7B	Ammonium Compounds,
INDUSTRIAL WASTES		W74-01496 5A
The Impact of Water Pollution Abatement on	INTERDISCIPLINARY APPROACH	
	The Role of Universities in Water Resources	ION SELECTIVE ELECTRODES
Competition and Pricing in the Alabama Textile	Education: The Social Sciences,	Ion Selective Sensors,
Industry, W74-01101 5G	W74-01467 6B	W74-01506 5A
W/4-01101 3G		
INFRARED SPECTOPHOTOMETRY	INTERNAL GRAVITY WAVES	IONIZATION
Infrared Studies of Chlorinated Dibenzo-p-	Longshore Current Generation by Obliquely In-	Thermodynamics of Acid-Base Equilibria. II.
Dioxins and Structurally Related Compounds,	cident Internal Waves,	Ionization of m- and p-Hydrox-
W74-01509 5A	W74-01650 2E	ybenzotrifluoride and the Concept of Fluorine
W T T T T T T T T T T T T T T T T T T T	TAITED NATIONAL DESCRIPTION OF THE PARTY OF	Double Bond-No Bond Resonance,
INFRARED SPECTRA	INTERNAL WAVES	W74-01226 2K
Simple Direct Combination of Gas Chromatog-	Effects of Friction and Surface Tide Angle of	IONS
raphy and Vapor Phase Infrared Spectrometry,	Incidence on the Coastal Generation of Internal	Solvent Extraction of Metal 1.10-
W74-01355 5A	Tides, W74-01190 2E	Phenanthroline Complexes and Concentration
	W74-01190 2E	of Trace Amounts of Metal Ions Prior to Spec-
Infrared Studies of Chlorinated Dibenzo-p-	Longshore Current Generation by Obliquely In-	trophotometric or Flame Photometric Deter-
Dioxins and Structurally Related Compounds,	cident Internal Waves,	mination,
W74-01509 5A	W74-01650 2E	W74-01354 SA
INFRARED SPECTROMETRY		W 14-01354
Quantitative Analysis of Aqueous	INTERNATIONAL WATERS	Prediction of the Variation in the Chemistry of
Nitrite/Nitrate Solutions by Infrared Internal	International Field Year for the Great Lakes.	a Lake Resulting from an Increase in Soluble
Reflectance Spectrometry,	W74-01162 2H	Deposits: Application: The Sodium in Lake
W74-01402 2K	DIPERCE AND COMPA COS	Neuchatel,
W 74-01402 ZK	INTERSTATE COMPACTS	W74-01562 2H
INFRARED SPECTROSCOPY	The Interstate Water Pollution Compact-Paper	
Application of Infrared Fourier Transform	Tiger or Effective Regulatory Device,	IRAN
Spectroscopy to Analysis of Micro Samples,	W74-01450 5G	Soil and Water Conservation on Arable Lands,
W74-01303 2K	INTERTIDAL AREAS	W74-01633 3F
	Erosion of Tidal Flats Near Georgetown,	IRAN (ELBURS MT. RANGE)
INHIBITION	British Guiana,	Profile of the Vegetation of the Elburs Moun-
Inhibition by Fatty Acids of the Biodegradation	W74-01216 2J	tain Range (Northern Iran), (In German).
of Petroleum,		W74-01385 2I
W74-01537 5B	INTERTIDAL SEDIMENTS	W 14-01505
TVIDOTON:	The Effect of Microbial Activity Upon the	IRON
INJECTION	Sedimentary Sulphur Cycle,	Adsorption of Colloidal Iron by Bacteria,
Underground Storage of Texas Playa Lake	W74-01239 5B	W74-01253 5B
Waters by Injection Into the Ogallala Forma-	TAVEL A GEORGE	
tion Under Moderate Pump Pressure,	INVASION	Concentrations of Dissolved Forms of Fe, Mn,
W74-01627 4B	Effects of Leaf-Footed Bugs on Mesquite	and Cu in Marine Pore Waters of the Atlantic
INJUNCTIVE RELIEF	Reproduction,	Basin (Kontsentratsii rastvorennykh form Fe,
Sierra Club v. Mason (Action to Enjoin	W74-01638 4A	Mn, i Cu v morskikh, porovykh vodakh bas-
Dredging of New Haven Harbor).	INVERTEBRATE FAUNA	seyna Atlanticheskogo okeana),
W74-01456 6E	Invertebrate Fauna of Waters of the Station	W74-01392 2K
	'Agapa' (Western Taimyr), (In Russian),	Study of Chelated Mixtures of Ferric Ions with
City of Monmouth V. Environmental Protec-	apa (" voice a aud y 1 /, (an Aussian /,	
	W74-01264 21	Nitrilotriacetic Sulfo-S-Salicylic and
tion Agency (EPA Sued the City to Prohibit the	W74-01264 2I	Nitrilotriacetic, Sulfo-5-Salicylic and Pyrocatechol-3 5-Disulfonic Acids. (In French)
tion Agency (EPA Sued the City to Prohibit the City from Continuing to Maintain a Sewage	W74-01264 2I INVERTEBRATES	Pyrocatechol-3,5-Disulfonic Acids, (In French),
City from Continuing to Maintain a Sewage Lagoon System Which was Emitting Noxious		Pyrocatechol-3,5-Disulfonic Acids, (In French), W74-01440 5A
City from Continuing to Maintain a Sewage	INVERTEBRATES	Pyrocatechol-3,5-Disulfonic Acids, (In French),

Bacteriology of Activated Sludge, in Particular JUDICIAL DECISIONS

IRRIGATED CROPS

IRRIGATED CROPS	Bacteriology of Activated Sludge, in Particular	JUDICIAL DECISIONS
Nitrates in Soil and Ground Water Beneath Ir-	the Filamentous Bacteria,	In Re Spring Valley Development (Challenge to
rigated and Fertilized Crops,	W74-01540 5B	Order of Environmental Improvement Commis-
W74-01245 3F	Rhodopseudomonas Sulfidophila, Nov. Spec.,	sion Denying Development Along Side of Pond).
IRRIGATED SOILS	A New Species of the Purple Nonsulfur Bac-	W74-01454 6E
Physical Edaphology. The Physics of Irrigated	teria,	
and Nonirrigated Soils,	W74-01544 5B	Sierra Club v. Mason (Action to Enjoin
W74-01572 2G	Shigella Sonnei Isolated from Well Water,	Dredging of New Haven Harbor).
System of Treating Irrigated Soil which is	W74-01551 5A	W74-01456 6E
Sown with Sugar Beets, (In Russian),		Florida Pollution Statute Infringes Upon Exclu-
W74-01606 3F	ISOPRENOIDS C 18-Isoprenoid Ketone in Recent Marine Sedi-	sive Federal Maritime Legislative Domain, The
IRRIGATION	ment,	American Waterways Operators, Inc. v.
Relationship of Pumping Lift to Economic Use	W74-01301 5A	Askew, 335 F. Supp. 1241 (M.D. Fla).
of Groundwater for Irrigation,		W74-01460 5G
W74-01120 4B	ISOTOPE FRACTIONATION	City of Monmouth V. Environmental Protec-
Economics of Resource Use on Sample Farms	Isotope Fractionation of N-15 and N-14 in Microbiological Nitrogen Transformations: A	tion Agency (EPA Sued the City to Prohibit the
of Central Gujarat,	Theoretical Model,	City from Continuing to Maintain a Sewage
W74-01491 3F	W74-01541 5B	Lagoon System Which was Emitting Noxious
		Odors).
IRRIGATION COST	ISOTOPE STUDIES	W74-01462 6E
Crop Rotation Schemes for Optimal Utilization	Use of Isotopic Methods to Determine Present Rates of Snow Accumulation in Antarctica	JUNEAU ICEFIELD (ALAS)
of Agricultural Land, W74-01596 3F	(Ispol'zovaniye izotopnykh metodov dlya	On the Formation of Small Marginal Lakes on
1174-01370	opredeleniya sovremennoy skorsti nakopleniya	the Juneau Icefield, South-Eastern Alaska,
IRRIGATION DESIGN	snega v Antarktide),	U.S.A.,
Impact of Irrigation Investments on Regional	W74-01393 2C	W74-01379 2C
and Urban Development, W74-01625 6B	Isotopic Composition of Oxygen and Hydrogen	JURISDICTION
W 74-01023	in Sulfide Waters of the Sochi-Adler Artesian	Florida Pollution Statute Infringes Upon Exclu-
IRRIGATION DISTRICTS	Basin (Izotopnyy sostav kisloroda i vodorada	sive Federal Maritime Legislative Domain, The
Consolidation of Irrigation Systems: Phase 1,	sul'fidnykh vod Sochi-Adlerskogo artezian-	American Waterways Operators, Inc. v.
Engineering, Legal, and Sociological Con-	skogo basseyna),	Askew, 335 F. Supp. 1241 (M.D. Fla).
straints and/or Facilitators, W74-01367 3F	W74-01394 2K	W74-01460 5G
W/4-0130/	Isotopic Composition of Helium in Thermal	KANSAS
IRRIGATION EFFICIENCY	Springs of Iceland (Izotopnyy sostav geliya ter-	Population Dynamics of Pond Zooplankton, I.
Agricultural Water Demand in North Carolina:	mal'nykh istochnikov Islandii),	Diaptomus pallidus Herrick,
Phases I and II,	W74-01396 2K	W74-01502 5C
W74-01112 6D	ISRAEL	KARST
IRRIGATION PROGRAMS	Fisheries and Fish Culture in Israel in 1971,	Areas with Abundant Sinkholes in Knox Coun-
Impact of Irrigation Investments on Regional	W74-01570 6B	ty, Tennessee,
and Urban Development,	TODARY (ABANA DIPT NATION)	W74-01270 7C
W74-01625 6B	ISRAEL (ARAVA RIFT VALLEY) Metabolic Effects of Drinking Brackish Water,	TORIN ATT TO THE T
IRRIGATION SYSTEMS	W74-01632 5C	KENDALL'S TAU Extended Tables for Kendall's Tau,
Consolidation of Irrigation Systems: Phase 1,		W74-01497 7C
Engineering, Legal, and Sociological Con-	ISRAEL (LAKE KINNERET)	
straints and/or Facilitators, W74-01367 3F	Metalimnic Layer in Lake Kinneret, Israel, W74-01598 5C	KENT COUNTY (TEX)
W74-01367 3F	W/4-01576	Recognition of Natural Brine by Electrical
A Hybrid Model for Irrigation Planning Using	ITALY (BOGNANCO VALLEY)	Soundings Near the Salt Fork of the Brazos River, Kent and Stonewall Counties, Texas,
Chance Constrained Programming and	Notes on the Dynamics of the Reproductive	W74-01370 2F
Hydrologic Simulation,	Activity of Arctodiaptomus Bacillifer in High Altitude Alpine Lakes,	117-01370
W74-01488 4B	W74-01209 2H	KENTUCKY
IRRIGATION WATER		A Growing Community: 1973 Update, (Lexing-
Irrigation Waters of the Indus Plains and Their	JAPAN	ton, Kentucky).
Salt Load,	Quaternary Shorelines of the Seas of Okhotsk	W74-01484 SD
W74-01639 3C	and Japan (Chetvertichnyye beregovyye linii Okhotskogo i Yaponskogo morey),	KENTUCKY (WILGREEN LAKE)
ISLANDS	W74-01391 2J	Some Observations on Bacterial Populations in
Alluvion, Islands, and Sand Bars,		Wilgreen Lake, Madison, KY.,
W74-01612 6E	JAPAN (LAKE BIWA)	W74-01242 5B
ISOHALINE SURFACES	Some Sources of Error in the 14C Method for Estimating Primary Productivity and Their	KETONES
Tidal Period Oscillations of an Isohaline Sur-	Relationship to Light Intensity During Incuba-	C 18-Isoprenoid Ketone in Recent Marine Sedi-
face Off the Mouth of the Columbia River,	tion,	ment,
W74-01188 2L	W74-01217 2H	W74-01301 5A
ISOLATION	JAPAN (TOKYO BAY)	Critical Study of the APCD-MIBK Extraction
Studies on Methanol-Oxidizing Bacteria. I.	Silica Gel Medium for Enumeration of Petrole-	System for Atomic Absorption,
Isolation and Growth Studies,	umlytic Microorganisms in the Marine Environ-	W74-01329 5A
W74-01535 5C	ment,	Distribution Studies of Batima and Col
Investigations on the Sheathed Bacterium	W74-01532 5A	Distribution Studies of Radium and Other Metallic Elements Between Thenovl-
Haliscomenobacter hydrossis Gen.n., Sp.n.,	JETS	trifluoroacetone in Methyl Isobutyl Ketone and
Isolated from Activated Sludge,	Flow Visualization in Free Shear Layers,	Aqueous Solutions,
W74-01539 5B	W74-01271 8B	W74-01494 5A

KINEMATICS (SEDIMENT TRANSPORT) Experimental Investigation of the Effect of Sal-	Chlorinated Hydrocarbon Insecticides in Sedi- ments of Southern Lake Michigan,	LAND USE/WATER Relating Comprehensive Sewer and Water
tating Sediments on Kinematics of Flow (Ek-	W74-01397 5B	Plans to the County Land Use Plan. Goals, Policies and Standards.
sperimental'noye issledovaniye vliyaniya sal'- tiruyushchikh nanosov na kinematiku potoka),	LAKE RESTORATION	W74-01473 5D
W74-01134 2J	Swedish Lake Restoration Program Gets	LANDFILLS
KINETICS	Results,	A Cost-Effectiveness Study and Analysis of
Mechanism of NTA Degradation By a Bacterial	W74-01262 5G	Municipal Refuse Disposal Systems,
Mutant,	LAKE SEDIMENTS	W74-01631 5E
W74-01515 5B	The Oxygen Status of Lake Sediments,	
	W74-01266 2J	LARVAE
KNOX COUNTY (TENN)	_	Behavioral Responses to Changes in Hydro-
Engineering Characteristics of Overburden in	Chlorinated Hydrocarbon Insecticides in Sedi-	static Pressure and Light During Larval Development of the Lobster Homarus Gam-
Knox County, Tennessee, W74-01143 7C	ments of Southern Lake Michigan,	marus,
W/4-01145	W74-01397 5B	W74-01436 5C
Overburden Related to Type of Bedrock and	LAKE STAGES	
Engineering Characteristics of the Bedrock,	A Mathematical Model of Primary Productivity	LAUDERIA
Knox County, Tennessee,	and Limnological Patterns in Lake Mead,	Modifications in Filtration Methods for the
W74-01144 7C	W74-01630 5C	Measurement of Inorganic C-14 Uptake by
Categories of Relative Feasibility for Septic-		Photosynthesizing Algae, W74-01425 5A
Tank Filter Fields in Knox County, Tennessee,	LAKE SUPERIOR	W /4-01425
W74-01145 7C	The Distribution, Composition and Biomass of	LEAD
	the Crustacean Zooplankton Population in	The Determination of Lead and Nickel by
Soil Association Map of Knox County, Tennes-	Western Lake Superior,	Atomic-Absorption Spectrometry with a
see.	W74-01109 5C	Flameless Wire Loop Atomizer,
W74-01146 7C	Shifting Offshore Bars and Harbor Shoaling,	W74-01363 5A
Ground-Water Yield Potential in Knox County,	W74-01191 2J	Modified Delves Cup Atomic Absorption
Tennessee,	W/7-01171	Determination of Lead in Blood,
W74-01147 7C	LAKES	W74-01415 5A
	On the Formation of Small Marginal Lakes on	
Areas of Possible Flooding in Knox County,	the Juneau Icefield, South-Eastern Alaska,	Ion Selective Sensors,
Tennessee, W74-01269 7C	U.S.A.,	W74-01506 5A
W /4-01209 /C	W74-01379 2C	Analytical Applications of Pulsed Voltammetric
Areas with Abundant Sinkholes in Knox Coun-	Mahawk Lake Study Breatford Octobs	Stripping at Thin Film Mercury Electrodes,
ty, Tennessee,	Mohawk Lake Study, Brantford, Ontario. W74-01476 2J	W74-01514 5A
W74-01270 7C	W/4-014/0	
A BOD A TODY POLIDWENT	Growth and Buoyancy of Microcystis aeru-	Particulate Metals in Waters of Sorfjord West
LABORATORY EQUIPMENT Simple Direct Combination of Gas Chromatog-	ginosa Kutz. Emend. Elenkin in a Shallow	Norway,
raphy and Vapor Phase Infrared Spectrometry,	Eutrophic Lake,	W74-01528 5B
W74-01355 5A	W74-01518 5C	LEAF TEMPERATURE
	* *************************************	Leaf Temperatures, Diffusion Resistances, and
LAGOONS	LAMINARIA SINCLAIRII	Transpiration,
The Role of Micro-Organisms in Waste Tip-	Observations on the Ecology of Laminaria Sin- clairii on Three Northern Oregon Beaches,	W74-01254 2D
Lagoon Systems Purifying Coke-Oven Effluents,	W74-01423 5C	LEAVES
W74-01647 5D	W/4-01425	Leaves as Source of Phosphorus,
W/4-01041	LAMPSILIS-RADIATA	W74-01407 5B
LAKE ERIE	Distribution and Morphological Variation of	
Currents at Toledo Harbor,	Lampsilis radiata (Pelecypoda, Unionidae) in	LEBANON (SINBAD BEACH)
W74-01214 2H	Some Central Canadian Lakes: A Multivariate	Sand Beach Bacteria: Enumeration and
LAKE ICE	Statistical Approach,	Characterization,
Ice Calving into the Proglacial Generator Lake,	W74-01608 2H	W74-01444 5A
Baffin Island, N.W.T., Canada,	LAND USE	LEGAL ASPECTS
W74-01376 2C	Land Use and Mapping,	Consolidation of Irrigation Systems: Phase 1,
	W74-01165 4A	Engineering, Legal, and Sociological Con-
LAKE JACKSON (FLA)	11000000	straints and/or Facilitators,
Changes in Species Composition of Phytoplankton Due to Enrichment by N, P, and	Multidisciplinary/Regional Resource Surveys,	W74-01367 3F
Si of Water From a North Florida Lake,	W74-01171 7B	Marine Pollution: A Critique of Present and
W74-01503 5C	Investment and Production of Information on	Proposed International Agreements and Institu-
	Inventory and Evaluation of Information on	tions-A Suggested Global Oceans' Environ-
LAKE MEAD	Delaware Bay, Volume 2. W74-01369 6E	mental Regime,
A Mathematical Model of Primary Productivity	W/4-01309	W74-01449 50
and Limnological Patterns in Lake Mead, W74-01630 5C	A Linear Programming Approach to Floodplain	In Re Spring Valley Development (Challenge to
W 17-01030	Land Use Planning in Urban Areas,	Order of Environmental Improvement Commis
LAKE MICHIGAN	W74-01490 3D	sion Denying Development Along Side of
Coastal Processes and Beach Dynamics at	Consent Scale Interesting with the S	Pond).
Sheboygan, Wisconsin, July, 1972,	Concept-Scale Interaction with the Semantic	W74-01454 6E
W74-01130 2H	Differential Technique, W74-01644 6B	Opension of Western St
A Profile of the Four Moment Measures Per-		Operation of Watercraft. W74-01455 6E
pendicular to a Shore Line, South Haven,	LAND USE PLANNING	W74-01455 6E
Michigan,	Floodland and Shoreland Development Guide.	Early Thoughts on Prosecuting Polluters,
W74-01184 2H	W74-01483 4A	W74-01613 50

LEGISLATION

EGISLATION	LIFE CYCLES	LITMUS MILK REACTION
The Shipowner and Oil Pollution Liability, W74-01447 5G	Emergence, Reproduction, and Growth of Setipalpian Plecoptera in Southern Ontario,	Litmus Milk Reaction as a Distinguishing Fea- ture Between Streptococcus Faecalis of Human and Non-Human Origins,
Virginia Natural Resources Law and the New	W74-01359 5A	W74-01549 5A
Virginia Wetlands Act,	LIFE HISTORY STUDIES	
W74-01448 2L	Emergence, Reproduction, and Growth of Setipalpian Plecoptera in Southern Ontario,	LITTORAL DRIFT Shifting Offshore Bars and Harbor Shoaling,
Water Pollution in Louisiana: An Attempt at	W74-01359 5A	W74-01191 2J
Control, W74-01451 5G		LOBSTERS
	LIGAND EXCHANGE METHOD The Determination of Organo-Sulfur Com-	Behavioral Responses to Changes in Hydro-
A Bill to Establish the Canaveral National	pounds by Thin-Layer Chromatography Via a	static Pressure and Light During Larval
Seashore in the State of Florida. W74-01457 6E	Ligand-Exchange Precess,	Development of the Lobster Homarus Gam-
W/4-0143/	W74-01439 5A	marus, W74-01436 5C
A Bill to Establish in the State of California the	LIGANDS	
Santa Monica Mountain and Seashore National	Chemical Constants of Metal Complexes from	LOGGING (RECORDING)
Urban Park. W74-01458 6E	a Complexometric Titration Followed with Anodic Stripping Voltammetry,	Prediction of Well Development Possibilities in Delaware by means of Calibrated Gamma-Ray
The Porter-Cologne Water Quality Control Act,	W74-01332 5A	Logs, W74-01106 4B
and Related Water Code Sections (Containing		W 74-01100 4B
the 1971 Amendments).	LIGHT INTENSITY	LONG HARBOUR (NEWFOUNDLAND)
W74-01461 5G	Techniques for Measuring Light Absorption	Growth Rates of Intertidal Molluscs as Indica-
Alluvion, Islands, and Sand Bars,	Scattering, and Particle Concentrations in Water.	tors of Effects of Unexpected Incidents of Pol-
W74-01612 6E	W74-01283 7B	lution, W74-01434 5C
A Bill to be Known as the 'River Basin Waste		
Treatment Authority Act of 1973'.	LIGNIN	LONG WAVES
W74-01614 6E	Fate of Lignin in Kraft Effluent Treatment,	Note on the Equations of Long Waves Over an Uneven Bottom.
	W74-01320 5B	W74-01189 2E
Federal Water Pollution Control Act Amend-	LIMESTONE DEPOSITS	
ments of 1972. W74-01615 5G	Study of the Speed of Water Circulation in a	LONGITUDINAL DISTRIBUTION
W/4-01613	Water-Bearing Limestone Deposit by Tracing	Longitudinal Distribution and Habitat of the
A Bill to Aid the Conservation of Natural	Tests (La Serriere River Basin/NE),	Fishes of Mason Creek, an Upper Roanoke River Drainage Tributary, Virginia,
Water Resources.	W74-01563 2F	W74-01592 2I
W74-01616 6E	LIMESTONES	
A Bill to Provide for the Establishment of the	Chemical Relationships Between Surface	LONGSHORE CURRENTS
Guana River National Park in the State of	Water and the Ground in South Florida,	Longshore Current Velocity: A Review of
Florida.	W74-01153 2K	Theory and Data, W74-01187 2E
W74-01617 6E	LIMITING FACTORS	11/4-0110/
A Bill Authorizing the State of Illinois and the	Some Thoughts on Nutrient Limitation in Al-	The Generation of Longshore Currents on a
Metropolitan Sanitary District of Greater	gae,	Plane Beach,
Chicago to Increase the Diversion of Water	W74-01428 5C	W74-01208 2L
from Lake Michigan into the Illinois Waterway.		LOUISIANA
W74-01618 6E	LINDANE	Water Pollution in Louisiana: An Attempt at
Designating a Segment of the St. Croix as Part	Determination of Chlorinated Pesticides in	Control,
of Wild and Scenic Rivers System.	Whole Blood, W74-01417 5A	W74-01451 5G
W74-01619 6E	JA	Alluvion, Islands, and Sand Bars,
EMNA MINOR	LINEAR PROGRAMMING	W74-01612 6E
Nutrient Removal Using Lemna Minor,	Linear Programming and Channel Flow	LOW-FLOW AUGMENTATION
W74-01321 5C	Identification, W74-01277 8B	Review of Planning for the Grand River
ETHAL LIMIT		Watershed.
Sensitivity of Three Selected Bacterial Species	A Hybrid Model for Irrigation Planning Using	W74-01478 5D
to Ozone,	Chance Constrained Programming and Hydrologic Simulation,	LUBBOCK (TEX)
W74-01553 5F	W74-01488 4B	Recreational Reuse of Municipal Wastewater,
ETHAL TEMPERATURE		W74-01103 5D
Thermophilic Ostracod: Aquatic Metazoan with	A Linear Programming Approach to Floodplain	LYOPHILIZATION
the Highest Known Temperature Tolerance,	Land Use Planning in Urban Areas, W74-01490 3D	Viability of Lyophilized Microorganisms after
W74-01327 5C	30	Storage,
ETTUCE	LINEAR SURPLUS-PRODUCTION	W74-01538 5C
The Effect of Substrate Humidity on the	Population Biomass, Number of Individuals,	MACROINVERTEBRATES
Supply of Macroelements to Plants, (In Latvi-	Average Individual Weight, and the Linear Sur-	Effect of Spoil Disposal on Benthic Inver-
an),	plus Production Model, W74-01593 2I	tebrates,
W74-01241 3F	21	W74-01420 5C
EXINGTON (KY)	LIQUID-DRESSED PLANTS	Benthic Macroinvertebrates as Indexes of
A Growing Community: 1973 Update, (Lexing-	Effect of an Increased Water Rate in Liquid	Water Quality in Whetstone Creek, Morrow
ton, Kentucky).	Dressing on Sugar Beet Yield, (In Russian),	County, Ohio (Scioto River Basin),

MACROPHYTES	MANITOBA (CANADA)	MATHEMATICAL MODELS
Growth Rate and Development of the Root/Shoot Ratio in Reedswanp Macrophytes	Single-Velocity Method in Measuring	Mathematical Modeling of Nutrient - Trans- port,
Grown in Winter Hydroponic Cultures,	Discharge, W74-01161 2C	W74-01121 5B
W74-01346 2I	MAPLE CANKER	Reservoir Mechanism in an Aquifer of Arbitra-
MACRORETICULAR CATION EXCHANGE RESINS	The Relationship Between Maple Canker Incidence and Precipitation,	ry Boundary Shape, W74-01129 2F
Gas-Solid Chromatography on Macroreticular Cation Exchange Resins,	W74-01602 2I	Sensitivity of Groundwater flow Models to
W74-01495 5A	MAPPING	Vertical Variability of Aquifer Constants,
	Ground-Water Yield Potential in Knox County,	W74-01151 4B
MACTAQUAC DAM (N.B.) Supersaturation of Nitrogen in Water During	Tennessee,	Computer Simulation of Estuarial Networks,
Passage Through Hydroelectric Turbines at Mactaquac Dam,	W74-01147 7C	W74-01197 2L
W74-01432 5C	Agriculture, Forestry, Range Resources,	Hydrodynamic Modeling of Two-Dimensional
	W74-01164 3F	Watershed Flow,
MAINE	Land Use and Mapping,	W74-01278 2A
Holbrook Cove Survey-A 1972 Student	W74-01165 4A	Some Thoughts on Nutrient Limitation in Al-
Summer Ocean Engineering Laboratory Research Project.		gae,
W74-01131 5B	Areas of Possible Flooding in Knox County, Tennessee,	W74-01428 5C
In Re Spring Valley Development (Challenge to	W74-01269 7C	Computer Identification of Bacteria on the
Order of Environmental Improvement Commis-	MARINE ALGAE	Basis of Their Antibiotic Susceptibility Pat-
sion Denying Development Along Side of	Concentrations of Plutonium, Cobalt, and	terns, W74-01443 5A
Pond). W74-01454 6E	Silver Radionuclides in Selected Pacific	W/4-01443
W74-01454 6E	Seaweeds,	Application of Mathematical Modelling to
Further Studies of Fish Predation on Salmon	W74-01297	Water Quality Management,
Stocked in Maine Lakes,	New Records of Sargassum Hawaiiensis Doty	W74-01486 5B
W74-01603 2H	and Newhouse (Sargassaceae, Phaeophyta), a Deep Water Species,	A Mathematical Model of Primary Productivity
MALATHION	W74-01349 2I	and Limnological Patterns in Lake Mead,
The Effect of Aldrin on Water Balance in the		W74-01630 5C
Freshwater Pulmonate Gastropod	Sublittoral Benthic Marine Algae of Southern	MATRIX EFFECTS
(Biomphalaria glabrata),	Cape Cod and Adjacent Islands: Pseu-	Emission Spectrometric Determination of
W74-01525 5C	dolithoderma Paradoxum Sp. Nov. (Ralf- siaceae, Ectocarpales),	Trace Metals in Biological Tissues.
Swimming Endurance and Resistance to	W74-01350 5A	W74-01546 5A
Copper and Malathion of Bluegills Treated by		MAXIMUM PERMISSIBLE CONCENTRATION
Long-Term Exposure to Sublethal Levels of	Observations on the Ecology of Laminaria Sin-	Substantiation of the Maximum Permissible
Hydrogen Sulfide, W74-01579 5C	clairii on Three Northern Oregon Beaches, W74-01423 5C	Concentration of ANP-2 Compound in Water Bodies, (In Russian),
MALAYSIA (MALACCA RIVER)	Physiological Ecology of Gelidiella Acerosa	W74-01581 5G
A Chemical Survey of the Malacca River,	(Forsskal) Feldmann et Hamel,	
W74-01600 2K	W74-01424 5C	MEASUREMENT
MALEIC HYDRAZIDE		Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye
Determination of Meleic Hydrazide Residues in	MARINE FISH The Amount of Space Available for Marine and	opredeleniya moshchnosti lednika Malyy
Tobacco and Vegetables,	Freshwater Fishes,	Azau),
W74-01418 5A	W74-01561 2I	W74-01390 2C
MANAGEMENT		MECHANICAL EQUIPMENT
Application of Mathematical Modelling to	MARKOV PROCESSES A Stochastic Model of Streamflow Based on	Automatic Samplers for Sewage and Effluents,
Water Quality Management,	the Theory of Functions of Markov Processes.	W74-01306 5A
W74-01486 5B	W74-01123 2E	MEMBRANE DI ECTRORES
A Linear Programming Approach to Floodplain		MEMBRANE ELECTRODES An Oxygen Electrode Microrespirometer.
Land Use Planning in Urban Areas,	MARYLAND	W74-01419 5A
W74-01490 3D	Estuarine Circulation Induced by Diffusion, W74-01222 2L	
Water Becourses Blancies Managhians (Lo	W/4-01222	MEMBRANE FILTER CHAMBERS
Water Resources Planning Mozambique (La Planification Des Resources en Eau au	MASS SPECTROMETRY	Survival of Coliform Bacteria in Natural Waters: Field and Laboratory Studies with
Mozamique),	Versatile Computer Generated Variable Ac-	Membrane-Filter Chambers,
W74-01629 6B	celerating Voltage Circuit for Magnetically	W74-01250 5B
MANGANESE	Scanned Mass Spectrometers. Use for Assays in the Picogram Range and for Assays of Stable	MEMBRANE FILTERS
Concentrations of Dissolved Forms of Fe, Mn.	Isotope Tracers,	Comparison of Gelman and Millipore Mem-
and Cu in Marine Pore Waters of the Atlantic	W74-01335 2K	brane Filters for Enumerating Fecal Coliform
Basin (Kontsentratsii rastvorennykh form Fe,		Bacteria,
Mn, i Cu v morskikh, porovykh vodakh bas-	MASSACHUSETTS Graduate Courses Palated to Water Passaurase	W74-01554 5A
seyna Atlanticheskogo okeana), W74-01392 2K	Graduate Courses Related to Water Resources. W74-01119 9A	MENYANTHES-TRIFOLIATA
17.7 VI372 2K		Batrachospermum Vagum Ag. in the Szczecin
MANGANESE SULFUR BACTERIA	Valuation of Visual-Cultural Benefits from	Pomerania, A Locality New to Poland, (In
Metalimnic Layer in Lake Kinneret, Israel,	Freshwater Wetlands in Massachusetts,	Polish),
W74-01598 5C	W74-01643 6B	W74-01219 2H

Study of Chelated Mixtures of Ferric Ions with METHANE BACTERIA

MERCURY

Natural Dispersion of Mercury from Puhipuhi, Northland, New Zealand,	Pyrocatechol-3,5-Disulfonic Acids, (In French),	Isolation and Growth Studies,
W74-01307 5B	W74-01440 5A	W74-01535 5C
Determination of Mercury After Room Tem- perature Digestion by Flameless Atomic Ab-	METAL COMPLEXES Chemical Constants of Metal Complexes from	METHANOL Rapid Gas Chromatographic Method for Deter-
sorption, W74-01315 5A	a Complexometric Titration Followed with Anodic Stripping Voltammetry,	mination of Residual Methanol in Sewage, W74-01410 5A
Literature on Mercury: Availability of English	W74-01332 5A	Studies on Methanol-Oxidizing Bacteria. I.
Translations, W74-01323 5A	Solvent Extraction of Metal 1,10- Phenanthroline Complexes and Concentration	Isolation and Growth Studies, W74-01535 5C
Mercury in the EnvironmentA Global Review	of Trace Amounts of Metal Ions Prior to Spec- trophotometric or Flame Photometric Deter-	METHEMOGLOBIN
Including Recent Studies in the Delaware Bay Region.	mination, W74-01354 5A	Epidemiological and Toxicological Aspects of Nitrates and Nitrites in the Environment,
W74-01373 5B		W74-01386 5C
Concentrations of Some Trace Metals in	Extraction-Photometric Determination of Uranium (IV) with Chlorophosphonazo-III,	METHODOLOGY
Pelagic Organisms and of Mercury in Northeast Atlantic Ocean Water,	W74-01364 5A	Novel Method of Raman Data Acquisition, W74-01330 2K
W74-01523 5C	METALIMNIC LAYER Metalimnic Layer in Lake Kinneret, Israel,	Simple Inexpensive Freeze-Drying Procedure,
MERCURY COMPOUNDS	W74-01598 5C	W74-01339 7B
Uptake of Methyl Mercuric Chloride and Mer-	METALS	Determination of Low Concentrations of
curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake	Evaluation of the Use of the Heated Graphite Atomizer for the Routine Determination of	Cobalt in Plant Material by Atomic Absorption Spectrophotometry,
by Erythrocytes in Vitro, W74-01412 5C	Trace Metals in Water,	W74-01356 2K
MESH SIZES	W74-01316 5A	A Procedure for the Estimation of Microgram
Assessment of Two Mesh Sizes for Interpreting	A Comparison of Fast Destruction Methods for the Determination of Trace Metals in Biological	Quantities of Triton X-100, W74-01360 5A
Life Cycles, Standing Crop, and Percentage Composition of Stream Insects, W74-01601 2I	Materials, W74-01317 5A	Simulating the Behavior of a Multi-Unit, Multi- Purpose Water-Resource System,
	Semiintegral Electroanalysis: Shapes of	W74-01468 6A
MESIC HABITAT Seasonal Water Potential Patterns in the Moun-	Neopolarograms, W74-01333 5A	River Basin Planning in the United States, W74-01472 6B
tain Brush Zone, Utah, W74-01588 2I	Investigation of Spectral Overlap of the Neon	Double Pulse Coulostatics,
MESQUITE	359.352-nm and Chromium 359.349-nm Spectral Lines in Atomic Absorption and Atomic	W74-01511 2K
Effects of Leaf-Footed Bugs on Mesquite Reproduction,	Fluorescence Spectrometry of Chromium, W74-01337 2K	Comparison of Gelman and Millipore Mem- brane Filters for Enumerating Fecal Coliform
W74-01638 4A	Lateral Diffusion Interferences in Flame	Bacteria,
METABOLIC PATHWAYS	Atomic Absorption and Emission Spec-	W74-01554 5A
Uptake of Methyl Mercuric Chloride and Mer- curic Chloride by Trout: A Study of Uptake	trometry, W74-01342 2K	MEXICO Impact of Irrigation Investments on Regional
Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro,	Concentrations of Dissolved Forms of Fe, Mn,	and Urban Development, W74-01625 6B
W74-01412 5C	and Cu in Marine Pore Waters of the Atlantic Basin (Kontsentratsii rastvorennykh form Fe,	MICROANALYSIS
METABOLISM	Mn, i Cu v morskikh, porovykh vodakh bas-	Application of Infrared Fourier Transform
2,4-dichlorophenoxyacetate metabolism by Arthrobacter sp.: Accumulation of a Chlorobu-	seyna Atlanticheskogo okeana), W74-01392 2K	Spectroscopy to Analysis of Micro Samples, W74-01303 2K
tenolide, W74-01550 5B	Element Constitution of Selected Aquatic Vascular Plants from Pennsylvania: Submersed	MICROBIAL ACTIVITY The Effect of Microbial Activity Upon the
Biodegradation of Phenylmercuric Acetate by	and Floating Leaved Species and Rooted Emergent Species,	Sedimentary Sulphur Cycle, W74-01239 5B
Mercury-Resistant Bacteria, W74-01555 5B	W74-01526 5A	
METABOLITES	METALS COMPLEXES	MICROBIAL DEGRADATION Studies of Rapid NTA-Utilizing Bacterial Mu-
Mechanism of NTA Degradation By a Bacterial	Pathways of Trace Elements in Arctic Lake Ecosystems,	tant,
Mutant, W74-01515 5B	W74-01401 5B	W74-01348 5B
	METEOROLOGICAL DATA	Mechanism of NTA Degradation By a Bacterial Mutant,
Separation and Identification of Carbofuran, Its Metabolites, and Conjugates Found in Fish	Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service,	W74-01515 5B
Exposed to Ring C-14-Labeled Carbofuran Using ITLC Silica Gel Strips,	W74-01290 7C	Degradative Versatility of Corynebacterium pseudodiphtheriticum NCIB 10803 which uses
W74-01577 5A	Climatological Stations in California, 1971,	Amides as Carbon Source,
METAL CHELATES	W74-01383 7C	W74-01536 5B

Probable Causes for the 1972 Red Tide in the Cape Ann Region of the Gulf of Maine, W74-01435 5C

Inhibition by Fatty Acids of the Biodegradation of Petroleum, W74-01537 5B

The Importance of Chelating Agents in Natural

5B

Waters and Wastewaters, W74-01326

Isotope Fractionation of N-15 and N-14 in	MIXING	MORPHOLOGICAL VARIATION
Microbiological Nitrogen Transformations: A	The Equations of Continuity for Seawater and	Distribution and Morphological Variation of
Theoretical Model,	River Water in Estuaries,	Lampsilis radiata (Pelecypoda, Unionidae) in
W74-01541 5B	W74-01207 2L	Some Central Canadian Lakes: A Multivariate
2,4-dichlorophenoxyacetate metabolism by	MIXTURES	Statistical Approach, W74-01608 2H
Arthrobacter sp.: Accumulation of a Chlorobu-	Quantitative Analysis of Aqueous	W 74-01000 221
tenolide,	Nitrite/Nitrate Solutions by Infrared Internal	MOSQUITO POPULATION
W74-01550 5B	Reflectance Spectrometry.	Some Influences of Aquatic Vegetation on the
	W74-01402 2K	Species and Number of Culicidae (Diptera) in
Biodegradation of Phenylmercuric Acetate by		Small Pools of Water,
Mercury-Resistant Bacteria,	MODEL STUDIES	W74-01609 2I
W74-01555 5B	Mathematical Modeling of Nutrient - Trans-	MOSQUITOFISH
The Role of Micro-Organisms in Waste Tip-	port,	Distribution of Alkyl Arsenicals in Model
Lagoon Systems Purifying Coke-Oven Ef-	W74-01121 5B	Ecosystem,
fluents,	The Committee of Lanches Committee on a	W74-01409 5C
W74-01647 5D	The Generation of Longshore Currents on a Plane Beach,	
	W74-01208 2L	MOUNTAIN BRUSH ZONE Seasonal Water Potential Patterns in the Moun-
MICROCYSTIS-AERUGINOSA	11.7 01200	tain Brush Zone, Utah,
Role of Silt in Microcystis Aeruginosa	Wave-Induced Water Particle Motion Measure-	W74-01588 2I
Development, (In Russian),	ments,	
W74-01368 5C	W74-01285 2E	MOVEMENT
Growth and Buoyancy of Microcystis aeru-		Wave-Induced Water Particle Motion Measure-
ginosa Kutz. Emend. Elenkin in a Shallow	Isotope Fractionation of N-15 and N-14 in	ments,
Eutrophic Lake,	Microbiological Nitrogen Transformations: A Theoretical Model,	W74-01285 2E
W74-01518 5C	W74-01541 5B	Seismic Evidence for Glacier Motion,
	W/4-01341 3B	W74-01378 2C
MIDGES	Population Biomass, Number of Individuals,	
Bottom Fauna as an Indicator of Water Quality	Average Individual Weight, and the Linear Sur-	MOZAMBIQUE
in Sweden's Large Lakes (Lakes Malaren, Vat-	plus Production Model,	Water Resources Planning Mozambique (La
tern and Vanern),	W74-01593 2I	Planification Des Resources en Eau au
W74-01531 5B		Mozamique), W74-01629 6B
MINE WASTES	MOISTURE STRESS	W74-01629 6B
Holbrook Cove SurveyA 1972 Student	Effect of Moisture Stress on Soybean (Glycine	MULTIDISCIPLINARY
Summer Ocean Engineering Laboratory	max (L.) Merr.), W74-01599 3F	The Role of Universities in Water Resources
Research Project.	W/4-01399	Education: The Social Sciences,
W74-01131 5B	MOLECULE-SIZE DISTRIBUTION	W74-01467 6B
	Molecule-Size Distribution of Soluble Humic	MULTIELEMENTAL ANALYSIS
MINERAL CYCLING	Compounds From Different Natural Waters,	Simultaneous Determination of Manganese,
Hydrologic Nutrient Cycle Interactions in	W74-01351 2H	Copper, Arsenic, Cadmium, Antimony and
Undisturbed and Manipulated Ecosystems		Mercury in Glacial Ice by Radioactivation,
(Watersheds),	MONITORING	W74-01361 5A
W74-01110 4C	Environment Surveys, W74-01167 5A	AAVIT MERITA CID DE CAN
MINERALS	W74-01167 5A	MULTIPHASE FLOW Numerical Solution of Multiphase Well Flow,
The Characteristics of the Raw Waters of	Monitoring Channel Catfish Use of a Demand	W74-01275 8B
Hasdeo River and Dhengur Nala at Korba (M.	Feeder,	W /4-012/5
P.),	W74-01237 8I	MULTIPLE-PURPOSE PROJECTS
W74-01240 5A		Physical System Modelling as a Tool in Water
	Automated Rapid Scan Instrument for Spec-	Resource Planning,
The Action of Mineral Fertilization on Pasture	troelectrochemistry in the Visible Region,	W74-01487 2A
Herbage, Irrigated with Sewage, (In Russian), W74-01559	W74-01331 2K	MULTISPECTRAL SCANNER IMAGERY
W74-01559 5D	Application of Mathematical Modelling to	Techniques for Measuring Light Absorption
MINNESOTA	Water Quality Management,	Scattering, and Particle Concentrations in
Designating a Segment of the St. Croix as Part	W74-01486 5B	Water,
of Wild and Scenic Rivers System.		W74-01283 7B
W74-01619 6E	Sr-87/Sr-86 Ratios and Total Strontium Con-	MULTIVARIATE ANALYSIS
**************************************	centrations in Surface Waters of the Scioto	Diatom Associations in Yaquina Estuary,
MISSISSIPPI	River Drainage Basin, Ohio, W74-01516 5B	Oregon : A Multivariate Analysis,
Nitrate Reduction in Soils: Effect of Soil	W/4-01510 3B	W74-01430 5B
Moisture Tension, W74-01583 2G	MONTANA (MIDDLE CREEK)	
20	Survival of Coliform Bacteria in Natural	MULTIVARIATE STATISTICS
Tallahala Creek Lake, Pascagoula River Basin.	Waters: Field and Laboratory Studies with	Objective Regionalization of Peak Flow Rates, W74-01174
Mississippi (Final Environmental Impact State-	Membrane-Filter Chambers,	W74-01174 4D
ment).	W74-01250 5B	MUNICIPAL WASTE WATER
W74-01610 4A	MOR?DS	Recreational Reuse of Municipal Wastewater,
MISSISSIPPI RIVER BASIN	Relation Between Total Body Weight and Con-	W74-01103 5D
Quality of Surface Waters of the United States,	centrations of Manganese, Iron, Copper, Zinc,	MUNICIPAL WASTES
1968: Parts 4 and 5. St Lawrence River Basin	and Mercury in White Muscle of Bluefish (Po-	MUNICIPAL WASTES Removal of Phosphate and Secondary B.O.D.
and Hudson Bay and Upper Mississippi River	matomus saltatrix) and A Bathyl-Dimersal Fish	from Tertiary treated Wastewater by Aquatic
Basins.	Antimora Rostrata,	Animals,
W74-01268 2K	W74-01413 5B	W74-01124 5D

MUNICIPAL WASTES

1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois,	An Oxygen Electrode Microrespirometer, W74-01419 5A	NITRATE REDUCTION Nitrate Reduction in Soils: Effect of Soil
Indiana, Michigan, Minnesota, Ohio, Wiscon-		Moisture Tension,
sin.	NEOPOLAROGRAMS Semiintegral Electroanalysis: Shapes of	W74-01583 2G
W74-01282 5D	Neopolarograms,	NITRATES
MUSCLE	W74-01333 5A	Hydrologic Nutrient Cycle Interactions in
Relation Between Total Body Weight and Con-		Undisturbed and Manipulated Ecosystems
centrations of Manganese, Iron, Copper, Zinc, and Mercury in White Muscle of Bluefish (Po-	NEPHELOMETERS A Simple Portable Field Nephelometer,	(Watersheds),
matomus saltatrix) and A Bathyl-Dimersal Fish	W74-01247 7B	W74-01110 4C
Antimora Rostrata,	75	Nitrates in Soil and Ground Water Beneath Ir-
W74-01413 5B	NEUTRON ACTIVATION ANALYSIS	rigated and Fertilized Crops,
MUSSELS	Simultaneous Determination of Manganese,	W74-01245 3F
Growth Rates of Intertidal Molluscs as Indica-	Copper, Arsenic, Cadmium, Antimony and Mercury in Glacial Ice by Radioactivation,	Principle to Lord and Market State Assessed
tors of Effects of Unexpected Incidents of Pol-	W74-01361 5A	Epidemiological and Toxicological Aspects of Nitrates and Nitrites in the Environment.
lution,		W74-01386 5C
W74-01434 5C	Concentrations of Some Trace Metals in	11.77-01300 SC
Freshwater Mussel Ecology, Kentucky Lake,	Pelagic Organisms and of Mercury in Northeast Atlantic Ocean Water,	Quantitative Analysis of Aqueous
Tennessee, May 1, 1969-June 15, 1972,	W74-01523 5C	Nitrite/Nitrate Solutions by Infrared Internal
W74-01641 5C		Reflectance Spectrometry, W74-01402 2K
MUSSELS (FRESH WATER)	NEW JERSEY	W 74-01402 ZR
Greater Adaptability of Freshwater Mussels to	Tidal Cycle of Changes in an Equilibrium Beach, Sandy Hook, New Jersey,	NITRILOTRIACETIC ACID
Natural Rather Than to Artificial Displace-	W74-01198 2L	Studies of Rapid NTA-Utilizing Bacterial Mu-
ment, W74-01235		tant,
	Experiments and Hydrographic Surveys Off	W74-01348 5B
MYCETOMA	Sandy Hook, New Jersey (1963), W74-01199 2L	Ligand Photooxidation in Copper (II) Com-
A Waterborne Actinomycete Resembling	W/4-01199	plexes of Nitrilotriacetic Acid. Implications for
Strains Causing Mycetoma, W74-01256 5B	NEW MEXICO	Natural Waters,
-	Hydrologic Nutrient Cycle Interactions in	W74-01400 5B
MYCOTOXIN STANDARDS	Undisturbed and Manipulated Ecosystems (Watersheds),	Study of Chelated Mixtures of Ferric Ions with
Criteria for Mycotoxin Standards, W74-01414 5A	W74-01110 4C	Nitrilotriacetic, Sulfo-5-Salicylic and
		Pyrocatechol-3,5-Disulfonic Acids, (In French),
NATIONAL ENVIRONMENTAL POLICY ACT	Engineer's Report for South Valley Water	W74-01440 5A
Sierra Club v. Mason (Action to Enjoin Dredging of New Haven Harbor).	System. W74-01382 6B	Mechanism of NTA Degradation By a Bacterial
W74-01456 6E	W/4-01302	Mutant,
	Brush Eradicating, Basin Pitting, and Seeding	W74-01515 5B
City of Monmouth V. Environmental Protec- tion Agency (EPA Sued the City to Prohibit the	Machine for Arid to Semiarid Rangeland,	NITRITES
City from Continuing to Maintain a Sewage	W74-01637 4A	Epidemiological and Toxicological Aspects of
Lagoon System Which was Emitting Noxious	NEW RIVER (N.C.)	Nitrates and Nitrites in the Environment,
Odors).	A Bill to Aid the Conservation of Natural	W74-01386 5C
W74-01462 6E	Water Resources.	
NATIONAL PARKS	W74-01616 6E	Quantitative Analysis of Aqueous Nitrite/Nitrate Solutions by Infrared Internal
A Bill to Establish in the State of California the	NEW YORK	Reflectance Spectrometry,
Santa Monica Mountain and Seashore National Urban Park.	Relating Comprehensive Sewer and Water	W74-01402 2K
W74-01458 6E	Plans to the County Land Use Plan. Goals, Pol- icies and Standards.	
	W74-01473 5D	NITROBENZENE Solvent Extraction of Metal 1,10-
A Bill to Provide for the Establishment of the		Phenanthroline Complexes and Concentration
Guana River National Park in the State of Florida.	NEW ZEALAND	of Trace Amounts of Metal Ions Prior to Spec-
W74-01617 6E	A New Species of Boeckella (Copepoda: Cala- noida) from Northland, New Zealand,	trophotometric or Flame Photometric Deter-
NATIONAL SEASHORES	W74-01309 5A	mination,
A Bill to Establish the Canaveral National		W74-01354 5A
Seashore in the State of Florida.	NEW ZEALAND (BLUE LAKE)	NITROGEN
W74-01457 6E	Protozoa from Blue Lake, Raoul Island, W74-01310 5C	Evaluation of the Bio-Disc Treatment Process
NATIONAL WILD AND SCENIC RIVERS		for Summer Camp Application,
SYSTEM	NEW ZEALAND (WAIMAKARIRI RIVER)	W74-01118 5D
Report of Attitudes and Opinions of Recrea-	Effects of Paraquat on Invertebrates in a Can- tebury Stream, New Zealand,	Supersaturation of Nitrogen in Water During
tionists Towards Wild and Scenic Rivers: A Case Study of the St. Joe River.	W74-01298 5C	Passage Through Hydroelectric Turbines at
W74-01102 6B		Mactaquac Dam,
	NEW ZEALAND (WAIRUA RIVER) Natural Dispersion of Mercury from Puhipuhi,	W74-01432 5C
NATURAL STREAMS	Natural Dispersion of Mercury from Puhipuhi, Northland, New Zealand,	Changes in Species Composition of
The Effect of China-Clay Wastes on Stream Invertebrates,	W74-01307 5B	Phytoplankton Due to Enrichment by N, P, and
W74-01527 5C		Si of Water From a North Florida Lake,
NEWATORES	NICKEL The Determination of Lead and Nickel by	W74-01503 5C
NEMATODES Food Consumption of the Free-Living Aquatic	Atomic-Absorption Spectrometry with a	Nitrogen/Argon Ratios by Difference Thermal
Nematode Pelodera Chitwoodi,	Flameless Wire Loop Atomizer,	Conductivity,
W74-01225 5A	W74-01363 5A	W74-01522 5A

Isotope Fractionation of N-15 and N-14 in Microbiological Nitrogen Transformations: A Theoretical Model,	NUMERICAL ANALYSIS Computer Identification of Yeasts of the Genus Saccharomyces,	OAK Carbon Dioxide Exchange by Several Stream Side and Scrub Oak Community Species of Red
W74-01541 5B	W74-01646 5A	Butte Canyon, Utah,
NITROSAMINES	NUMERICAL TAXONOMY	W74-01590 21
N-Nitrosation by Nitrite Ion in Neutral and	Computer Identification of Yeasts of the Genus	OAK TREES
Basic Medium,	Saccharomyces,	Leaves as Source of Phosphorus,
W74-01328 5B	W74-01646 5A	W74-01407 5B
NITROSATION N-Nitrosation by Nitrite Ion in Neutral and	NUTRIENT ENRICHMENT Stream Community Response to Nutrient En-	OCEAN WAVES Wave-Induced Water Particle Motion Measure
Basic Medium, W74-01328 5B	richment,	ments, W74-01285 2F
W74-01328 5B	W74-01499 5C	W74-01285 2E
NONIRRIGATED SOILS Physical Edaphology. The Physics of Irrigated and Nonirrigated Soils,	Changes in Species Composition of Phytoplankton Due to Enrichment by N, P, and Si of Water From a North Florida Lake.	OCEANOGRAPHY Marine Resources and Ocean Surveys, W74-01169 7E
W74-01572 2G	W74-01503 5C	W 14-01105
NORMAL APPROXIMATION		Ocean Utilization and Coastal Zone Develop
Extended Tables for Kendall's Tau,	NUTRIENT REMOVAL	ment. W74-01281 2L
W74-01497 7C	Evaluation of the Bio-Disc Treatment Process for Summer Camp Application,	W/4-01201
	W74-01118 5D	OCEANS
NORTH CAROLINA		Quaternary Shorelines of the Seas of Okhotsi
Precipitation Variability Over North Carolina, W74-01111 2B	Nutrient Removal Using Lemna Minor, W74-01321 5C	and Japan (Chetvertichnyye beregovyye lini Okhotskogo i Yaponskogo morey), W74-01391
Agricultural Water Demand in North Carolina:	NUTRIENT REQUIREMENTS	
Phases I and II, W74-01112 6D	Copper Micronutrient Requirement for Algae, W74-01398 5C	Marine Pollution: A Critique of Present and Proposed International Agreements and Institu- tionsA Suggested Global Oceans' Environ-
Beach Changes on the Outer Banks of North	Rhodopseudomonas Sulfidophila, Nov. Spec.,	mental Regime,
Carolina, W74-01179 2E	A New Species of the Purple Nonsulfur Bacteria,	W74-01449 5G
The Circulation of Surface Waters in Raleigh	W74-01544 5B	OCOTILLO
Bay, North Carolina,	NUTRIENT TRANSPORT	Germination Responses of a Texas Population of Ocotillo (Fouquieria splendens Engelm.) To
W74-01210 2L	Mathematical Modeling of Nutrient - Trans-	Constant Temperature, Water Stress, pH and
Wastewater Characterization of Sweet Potato	port,	Salinity,
Processing,	W74-01121 5B	W74-01591 21
W74-01324 5A	NUTRIENTS	OEDOGONIUM CARDIACUM
Functional Water and Sewerage Plan and Pro-	Nutrient Sources and Transport in the Upper	The Effects of Bacteria on the Growth and
gram.	and Central Regions of the Big Sioux River,	Reproduction of Oedogonium Cardiacum,
W74-01469 5D	W74-01115 5B	W74-01422 50
A Bill to Aid the Conservation of Natural	Mathematical Modeling of Nutrient - Trans-	OFFSHORE BARS
Water Resources.	port,	Shifting Offshore Bars and Harbor Shoaling,
W74-01616 6E	W74-01121 5B	W74-01191 2
Table Cook Waterbal Com Coul Dec	Nutrient Removal Using Lemna Minor,	OGALLALA AQUIFER (OKLA)
Tallulah Creek Watershed (Long Creed Por- tion) Graham County, North Carolina (Final Environmental Impact Statement).	W74-01321 5C	Sensitivity of Groundwater flow Models to Vertical Variability of Aquifer Constants,
W74-01621 4D	Physiological Ecology of Gelidiella Acerosa	W74-01151 4E
NORTH NASHWAAKSIS REPRESENTATIVE	(Forsskal) Feldmann et Hamel, W74-01424 5C	OGALLALA FORMATION (WEST TEXAS)
BASIN (CANADA)	W/4-01424	Underground Storage of Texas Playa Lake
Computer Utilization of Hydrological Data for	Some Thoughts on Nutrient Limitation in Al-	Waters by Injection Into the Ogallala Forma
North Nashwaaksis Representative Basin,	gae,	tion Under Moderate Pump Pressure,
W74-01294 7C	W74-01428 5C	W74-01627 4E
NORTHWEST TERRITORIES (CANADA)	Phytoplankton Nutrients and Flushing of Inlets	ОНЮ
Single-Velocity Method in Measuring	on the Coast of Nova Scotia,	Currents at Toledo Harbor,
Discharge,	W74-01471 5B	W74-01214 2F
W74-01161 2C	Some Effects of Filtration on the Determina-	Sr-87/Sr-86 Ratios and Total Strontium Con
NORWAY (RIVER STRANDA)	tion of Nutrients in Fresh and Salt Water,	centrations in Surface Waters of the Sciote
Number and Size of Drifting Nymphs of	W74-01521 7B	River Drainage Basin, Ohio,
Ephemeroptera, Chironomidae, and Simulidae	Element Constitution of Selected Aquatic	W74-01516 51
by Day and Night in the River Stranda, Western Norway,	Vascular Plants from Pennsylvania: Submersed	Benthic Macroinvertebrates as Indexes of
W74-01230 2I	and Floating Leaved Species and Rooted Emer-	Water Quality in Whetstone Creek, Morrov
	gent Species,	County, Ohio (Scioto River Basin),
NORWAY (RORHOLTFJORDEN) 'Trapped Sea-Water' in Rorholtfjorden,	W74-01526 5A	W74-01517 51
W74-01263 2K	NYMPHS	OIL WASTES
	Number and Size of Drifting Nymphs of	Comparative Evaluation of the Efficacy o
NORWAY (SORFJORD)	Ephemeroptera, Chironomidae, and Simulidae	Ozonization and Other Means of Treating
Particulate Metals in Waters of Sorfjord West Norway,	by Day and Night in the River Stranda, Western Norway,	Water Containinated With Oil Products (In Russian).
W74-01528 5B	W74-01230 2I	W74-01580 51

OIL WELLS

	Similar Direct Continues of Con Champton	OWNERS DEMAND
OIL WELLS	Simple Direct Combination of Gas Chromatog-	OXYGEN DEMAND
Numerical Solution of Multiphase Well Flow, W74-01275	raphy and Vapor Phase Infrared Spectrometry,	Coupling Carbon Flow Through Some Pelagic
W74-01275 8B	W74-01355 5A	and Benthic Communities,
OILY WATER	Degradative Versatility of Corynebacterium	W74-01437 5B
Vortex Concept for Separating Oil from Water,	pseudodiphtheriticum NCIB 10803 which uses	OXYGEN DIFFUSION
W74-01148 5G	Amides as Carbon Source,	
W/4-012-10	W74-01536 5B	Soil Aeration Response to Draining Intensity in
OKLAHOMA	W/4-01330	Basin Peat,
Sensitivity of Groundwater flow Models to	ORGANIC MATTER	W74-01255 2G
Vertical Variability of Aquifer Constants,	Chlorinated Hydrocarbon Insecticides in Sedi-	OXYGEN ISOTOPES
W74-01151 4B	ments of Southern Lake Michigan,	
	W74-01397 5B	Isotopic Composition of Oxygen and Hydrogen
Objective Regionalization of Peak Flow Rates,	W/4-0139/	in Sulfide Waters of the Sochi-Adler Artesian
W74-01174 4D	The Chemical Oxygen Demand of Waters and	Basin (Izotopnyy sostav kisloroda i vodorada
OLIGOTROPHIC LAKES	Biological Materials from Ponds,	sul'fidnykh vod Sochi-Adlerskogo artezian-
	W74-01543 5C	skogo basseyna),
The Bottom Macrofauna of the Oligotrophic Lake Konnevesi, Finland,		W74-01394 2K
W74-01287 5C	ORGANIC PESTICIDES	OWIGHT PROTUPOLED AND
W /4-0128/	The Sensitivity of Suppressed and Unsup-	OXYGEN REQUIREMENTS
OOCYSTIS MARSSONII	pressed Lon Strains of Escherichia coli to	An Oxygen Electrode Microrespirometer,
Copper Micronutrient Requirement for Algae,	Chemical Agents with Induce Filamentation,	W74-01419 5A
W74-01398 5C	W74-01524 5C	
	W 7 4 01324	OXYGENATION
OPEN CHANNEL FLOW	ORGANOAMMONIUM COMPOUNDS	Mobile Oxygen Dispersion Craft,
Linear Programming and Channel Flow	Ion Pair Partition Chromatography of Organic	W74-01232 5G
Identification,	Ammonium Compounds,	
W74-01277 8B	W74-01496 5A	OYSTERS
	W/4-01430	Biochemistry of Estuarine Ecosystem with
OPTIMAL UTILIZATION	ORGANOLEPTIC PROPERTIES	Emphasis on Heavy Metals and Shellfish,
Crop Rotation Schemes for Optimal Utilization	Barrier Role of Water Works Installations in	W74-01108 5C
of Agricultural Land,	Respect to Chemical Contaminations Classified	
W74-01596 3F	According to Organoleptic Properties of	Microbial Flora and Level of Vibrio
ODD CNAME	Hazards, (In Russian),	Parahaemolyticus of Oysters (Crassostrea Vir-
ORB SNAILS	W74-01584 5D	ginica), Water and Sediment from Galveston
The Effect of Aldrin on Water Balance in the	W 74-01364 3D	Bay,
Freshwater Pulmonate Gastropod	ORGANONITROGEN COMPOUNDS	W74-01548 5C
(Biomphalaria glabrata),	Atomic Absorption Method for Determining	
W74-01525 5C	Micromolar Quantities of Aliphatic Secondary	OZONE
OREGON	Amines,	Sensitivity of Three Selected Bacterial Species
Observations on the Ecology of Laminaria Sin-	W74-01492 5A	to Ozone,
clairi on Three Northern Oregon Beaches,	W/4-01472	W74-01553 5F
W74-01423 5C	ORGANOSULFUR COMPOUNDS	
1177-01723	The Determination of Organo-Sulfur Com-	OZONIZATION
Diatom Associations in Yaquina Estuary,	pounds by Thin-Layer Chromatography Via a	Comparative Evaluation of the Efficacy of
Oregon : A Multivariate Analysis,	Ligand-Exchange Precess,	Ozonization and Other Means of Treating
W74-01430 5B	W74-01439 5A	Water Containinated With Oil Products (In
	W. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	Russian),
Water Master Plan. Eugene-Springfield Ur-	OUTFALL SEWERS	W74-01580 5F
banizing Area.	A Study of Tidal Dispersion in the Potomac	
W74-01479 3D	River,	PACIFIC OCEAN
ORCANIC ACIDS	W74-01196 5B	The Union of the Columbia River and the
ORGANIC ACIDS	W/4-01170	Pacific Ocean General Features,
Improved Distillation Method for Volatile Acids Analysis,	OVERBURDEN	W74-01183 2L
	Engineering Characteristics of Overburden in	
W74-01322 5A	Knox County, Tennessee,	PAKISTAN
Practical Methods for Derivatizing and Analyz-	W74-01143 7C	Water Requirements of Wheat and Cotton on a
ing Bacterial Metabolites with a Modified Auto-		High Water Table Soil Under Arid Conditions,
matic Injector and Gas Chromatograph,	Overburden Related to Type of Bedrock and	W74-01595 3F
W74-01336 5A	Engineering Characteristics of the Bedrock,	
	Knox County, Tennessee,	PANKHURST TUBES
Study of Chelated Mixtures of Ferric Ions with	W74-01144 7C	Pankhurst Tubes Modified to Indicate
Nitrilotriacetic, Sulfo-5-Salicylic and	, ,	Anaerobiosis,
Pyrocatechol-3,5-Disulfonic Acids, (In French),	OXIDATION	W74-01545 5A
W74-01440 5A	Studies on Methanol-Oxidizing Bacteria. I.	
OBCANIC COMPOUNDS	Isolation and Growth Studies,	PAPER CHROMATOGRAPHY
ORGANIC COMPOUNDS	W74-01535 5C	Separation of Polyphosphates by Paper Chro-
C 18-Isoprenoid Ketone in Recent Marine Sedi-		matography with a New Solvent,
ment,	OXYGEN	W74-01366 5A
W74-01301 5A	'Trapped Sea-Water' in Rorholtfjorden,	
Novel Method of Raman Data Acquisition,	W74-01263 2K	PAPUA NEW GUINEA
W74-01330 2K		Water Use by Perennial Evergreen Plant Com-
2K	The Oxygen Status of Lake Sediments,	munities in Australia and Papua New Guinea,
Versatile Computer Generated Variable Ac-	W74-01266 2J	W74-01634 2D
celerating Voltage Circuit for Magnetically		
Scanned Mass Spectrometers. Use for Assays	OXYGEN CONSUMPTION	PARAQUAT
in the Picogram Range and for Assays of Stable	The Chemical Oxygen Demand of Waters and	Effects of Paraquat on Invertebrates in a Can-
Isotope Tracers,	Biological Materials from Ponds,	tebury Stream, New Zealand,
W74-01335	W74-01543 SC	W74_01298 5C

PARTICLE SHAPE	PENNSYLVANIA	Algal Succession on Artificial Reefs in a
Cohesionless, Fine Graded, Flaked Sediment Transport by Water,	Stream Community Response to Nutrient En- richment,	Marine Lagoon Environment in Guam, W74-01429 5C
W74-01125 2J	W74-01499 5C	BURNA WEIR OF THE
PATH OF POLLUTANTS Nutrient Sources and Transport in the Upper and Central Regions of the Big Sioux River,	Element Constitution of Selected Aquatic Vascular Plants from Pennsylvania: Submersed and Floating Leaved Species and Rooted Emer-	PHENANTHROLINE Solvent Extraction of Metal 1,10- Phenanthroline Complexes and Concentration of Trace Amounts of Metal Ions Prior to Spec-
W74-01115 5B	gent Species, W74-01526 5A	trophotometric or Flame Photometric Deter- mination,
Mathematical Modeling of Nutrient - Trans-	The Relationship Between Maple Canker In-	W74-01354 5A
port, W74-01121 5B	cidence and Precipitation,	PHENOLS
On the Samuel Maniputal Diffusion Name	W74-01602 2I	The Role of Micro-Organisms in Waste Tip-
On the Small-Scale Horizontal Diffusion Near the Coast.	PERCHES	Lagoon Systems Purifying Coke-Oven Ef-
W74-01186 5B	Temperature Selection by Juvenile and Adult Yellow Perch (Perca Flavescens) Acclimated to	fluents, W74-01647 5D
A Study of Tidal Dispersion in the Potomac	24 C, W74-01353 5A	PHENYLMERCURIC ACETATE
River, W74-01196 5B		Biodegradation of Phenylmercuric Acetate by Mercury-Resistant Bacteria,
Natural Dispersion of Mercury from Puhipuhi,	PERFORMANCE EVALUATION Small-Volume Solid-Electrode Flow-Through	W74-01555 SB
Northland, New Zealand, W74-01307 5B	Electrochemical Cells. Preliminary Evaluation Using Pulse Polarographic Techniques,	PHOSPHATE REMOVAL
	W74-01445 7B	Removal of Phosphate and Secondary B.O.D. from Tertiary treated Wastewater by Aquatic
N-Nitrosation by Nitrite Ion in Neutral and Basic Medium,	PERIPHYTIC ALGAE	Animals,
W74-01328 5B	The Relations of Periphytic and Planktonic	W74-01124 5D
Pathways of Trace Elements in Arctic Lake	Algal Growth in an Estuary to Hydrographic Factors.	PHOSPHATES
Ecosystems,	W74-01571 5C	Evaluation of Flame Emission Determination
W74-01401 5B	PERIWINKLES	of Phosphorus in Water, W74-01116 SA
Particulate Metals in Waters of Sorfjord West	Growth Rates of Intertidal Molluscs as Indica- tors of Effects of Unexpected Incidents of Pol-	Prevention of Selenium Interference with Mea-
Norway, W74-01528 5B	lution,	surement of Phosphate as its Molybdenum (V-
PATHOGENIC BACTERIA	W74-01434 5C	VI) Complex, W74-01345 5A
Practical Methods for Derivatizing and Analyz-	PERMEABILITY	W/4-01343
ing Bacterial Metabolites with a Modified Auto- matic Injector and Gas Chromatograph, W74-01336 5A	Calculation of Permeability of Cretaceous Sandstones from Pumping and Static Level Data in Selected Areas of Western South	Separation of Polyphosphates by Paper Chro- matography with a New Solvent, W74-01366 5A
Computer Identification of Bacteria on the	Dakota, W74-01113 2F	PHOSPHOMOLYBDATES
Basis of Their Antibiotic Susceptibility Pat-	PESTICIDE RESIDUES	Prevention of Selenium Interference with Mea-
terns, W74-01443 5A	Variation of Organochlorine Residue Levels with Age in Gulf of St. Lawrence Harp Seals	surement of Phosphate as its Molybdenum (V- VI) Complex,
Microbial Flora and Level of Vibrio	(Pagophilus Groenlandicus),	W74-01345 5A
Parahaemolyticus of Oysters (Crassostrea Vir-	W74-01300 5A	PHOSPHORIMETRY
ginica), Water and Sediment from Galveston Bay,	PESTICIDES	Determination of Griseofulvin by Time- Resolved Phosphorimetry,
W74-01548 5C	Ecological Impact of Pesticides, W74-01573 5C	W74-01224 5A
Shigella Sonnei Isolated from Well Water,		PHOSPHORUS
W74-01551 5A	PETROLEUMLYTIC MICROORGANISMS Silica Gel Medium for Enumeration of Petrole-	Evaluation of Flame Emission Determination of Phosphorus in Water.
Relationships of Indicator and Pathogenic Bac-	umlytic Microorganisms in the Marine Environ- ment,	W74-01116 5A
teria in Stream Waters, W74-01645 5B	W74-01532 5A	Evaluation of the Bio-Disc Treatment Process
PEAK DISCHARGE	PHAENNA	for Summer Camp Application, W74-01118 5D
Objective Regionalization of Peak Flow Rates,	Revision of Family and Some Generic Defini- tions in the Phaennidae and Scolecithricidae	
W74-01174 4D	(Copepoda: Calanoida),	Leaves as Source of Phosphorus, W74-01407 5B
PEAT	W74-01308 5A	Growth Rates of Intertidal Molluscs as Indica-
Peat Floating in the Reservoir of the Kiev Hydroelectric Station and its Role in Water	PHAEOPHYTA New Records of Sargassum Hawaiiensis Doty	tors of Effects of Unexpected Incidents of Pol- lution.
Contamination, (in Russian), W74-01352 5B	and Newhouse (Sargassaceae, Phaeophyta), a Deep Water Species,	W74-01434 5C
PELODERA CHIT WOODI	W74-01349 21	Changes in Species Composition of
Food Consumption of the Free-Living Aquatic Nematode Pelodera Chitwoodi,	Sublittoral Benthic Marine Algae of Southern Cape Cod and Adjacent Islands: Pseu-	Phytoplankton Due to Enrichment by N, P, and Si of Water From a North Florida Lake,
W74-01225 5A	dolithoderma Paradoxum Sp. Nov. (Ralf-	W74-01503 5C
PENICILLIN	siaceae, Ectocarpales), W74-01350 5A	PHOSPHORUS FERTILIZERS
The Sensitivity of Suppressed and Unsup-		Water Regime of Sunflower Under Different
pressed Lon Strains of Escherichia coli to Chemical Agents with Induce Filamentation,	Observations on the Ecology of Laminaria Sin- clairii on Three Northern Oregon Beaches,	Conditions of Phosphorus Nutrition, (In Russian),
W74-01524 5C	W74-01423 5C	W74-01227 3F

A Linear Programming Approach to Floodplain

PHYTOPLANKTON

PHOTODECOMPOSITION

PHOTODECOMPOSITION

plexes of Nitrilotriacetic Acid. Implications for	the Danube and of the Estuaries of the Prin-	W74-01490 3D
Natural Waters.	cipal Tributaries on Czechoslovak Territory,	35
W74-01400 5B	(In Czect.),	Water Resources Planning Mozambique (La
	W74-01371 2I	Planification Des Resources en Eau au
PHOTODEGRADATION	Bothwess of Tones Plaments in Annie Lake	Mozamique), W74-01629 6B
Analytical Methodology for Bioactive Com-	Pathways of Trace Elements in Arctic Lake Ecosystems,	117-01025
pounds. Photochemically Assisted Analysis of	W74-01401 5B	PLANT GROWTH
Chlorinated Hydrocarbon Pesticides in the		Growth and Buoyancy of Microcystis aeru-
Presence of Polychlorinated Biphenyls, W74-01493 5A	Modifications in Filtration Methods for the	ginosa Kutz. Emend. Elenkin in a Shallow
W74-01493 5A	Measurement of Inorganic C-14 Uptake by	Eutrophic Lake, W74-01518 5C
PHOTOLYSIS	Photosynthesizing Algae,	W 74-01316
Ethylenethiourea Degradation,	W74-01425 5A	PLANT GROWTH REGULATORS
W74-01340 5B	Phytoplankton Nutrients and Flushing of Inlets	Determination of Meleic Hydrazide Residues in
	on the Coast of Nova Scotia,	Tobacco and Vegetables,
PHOTOSYNTHESIS	W74-01471 5B	W74-01418 5A
Potential Usefulness of Antitranspirants for	Changes in Species Composition of	PLANT PHYSIOLOGY
Solution of Some Water Supply, Plant Growth,	Changes in Species Composition of Phytoplankton Due to Enrichment by N, P, and	Physiological Ecology of Gelidiella Acerosa
and Environmental Problems, W74-01105 3B	Si of Water From a North Florida Lake,	(Forsskal) Feldmann et Hamel,
W/4-01103	W74-01503 5C	W74-01424 5C
Loss of Photosynthetic Activity in Two Blue-		PLANT SPACING
Green Algae as a Result of Osmotic Stress,	A Mathematical Model of Primary Productivity	Desert Dogma Reexamined: Root/Shoot
W74-01302 5B	and Limnological Patterns in Lake Mead,	Productivity and Plant Spacing,
	W74-01630 5C	W74-01585 2I
Modifications in Filtration Methods for the	PIPELINES	
Measurement of Inorganic C-14 Uptake by	Tri-Agencies Pipeline: Engineering Report.	PLANT TISSUES
Photosynthesizing Algae,	W74-01477 8A	Determination of Mercury After Room Tem-
W74-01425 5A		perature Digestion by Flameless Atomic Ab- sorption,
Coupling Carbon Flow Through Some Pelagic	PLANARIANS	W74-01315 5A
and Benthic Communities,	Evaluation of the Response of Dugesia Tigrina	***************************************
W74-01437 5B	to Aflatoxin B1, W74-01404 5C	Prevention of Selenium Interference with Mea-
	W/4-01404	surement of Phosphate as its Molybdenum (V-
A New Type of Climatized Gas Exchange	PLANKTONIC ALGAE	VI) Complex,
Chamber for Net Photosynthesis and Trans-	The Relations of Periphytic and Planktonic	W74-01345 5A
piration Measurements in the Field, W74-01568	Algal Growth in an Estuary to Hydrographic	Determination of Low Concentrations of
W74-01568 2I	Factors,	Cobalt in Plant Material by Atomic Absorption
Diurnal Changes in Transpiration and Daily	W74-01571 5C	Spectrophotometry,
Photosynthetic Rater of Several Crop Plants,	PLANNING	W74-01356 2K
W74-01597 2D	Prospects for the Use and Conservation of	Simplified Spectrophotometric Analysis of
	Water Resources in the USSR (Perspektivy	Plants for Selenium,
PHOTOSYNTHETIC BACTERIA	ispol'zovaniya i okhrany vodnykh resursov	W74-01406 2K
Rhodopseudomonas Sulfidophila, Nov. Spec.,	SSSR),	
A New Species of the Purple Nonsulfur Bac-	W74-01387 6B	PLASMA
teria,	Functional Water and Sewerage Plan and Pro-	The Determination of Thallium in Urine and Plasma by Delves Cup Atomic Absorption,
W74-01544 5B	gram.	W74-01314 5A
PHREATOPHYTES	W74-01469 5D	W 74-01514
Potential Usefulness of Antitranspirants for		PLASTICITY INDEX
Solution of Some Water Supply, Plant Growth,	Promoting Environmental Quality Through	Study of Soil Plasticity over a wide Range of
and Environmental Problems,	Urban Planning and Controls,	Soil Moisture Contents,
W74-01105 3B	W74-01470 5D	W74-01636 2G
	River Basin Planning in the United States,	PLAYAS
PHRYGANEA-OBSOLETA	W74-01472 6B	Underground Storage of Texas Playa Lake
Factors Affecting the Distribution of Some		Waters by Injection Into the Ogallala Forma-
Phryganeaeid (Trichoptera) in Malham Tarn,	Relating Comprehensive Sewer and Water	tion Under Moderate Pump Pressure,
Yorkshire, W74-01586 2I	Plans to the County Land Use Plan. Goals, Pol- icies and Standards.	W74-01627 4B
W74-01586 2I	W74-01473 5D	PLECOPTERA
PHYLCTOCHYTRIUM POWHATANESIS	W/4-014/3	Assessment of Two Mesh Sizes for Interpreting
Two New Chytrids from the Appalachian	Comprehensive Water and Sewer Plan, Ran-	Life Cycles, Standing Crop, and Percentage
Highlands,	dolph County, Illinois.	Composition of Stream Insects,
W74-01305 5A	W74-01474 5D	W74-01601 21
BUVELCOCUENICAL BRODERSHIP	Water Master Plan. Eugene-Springfield Ur-	PLUTONIUM RADIONUCLIDES
PHYSICOCHEMICAL PROPERTIES	banizing Area.	Concentrations of Plutonium, Cobalt, and
Microfauna of Activated Sludge. Part III. The Effect of Physico-Chemical Factors on the Oc-	W74-01479 3D	Silver Radionuclides in Selected Pacific
currence of Microfauna in the Annual Cycle,	974'914 94 1.1. A A A A A	Seaweeds,
W74-01542 5C	Utility Provisions Analysis for East Central	W74-01297
	Florida. W74-01480 6D	POINT BARROW (ALASKA)
PHYSICOCHEMICAL STUDIES	W74-01480 6D	Shoreline Processes Near Barrow, Alaska: A
Contribution to Physicochemical Study of	Sketch Development Plan, Chambers County,	Comparison of the Normal and the
Some Springs of the Gapeau River Basin (Var),	Alabama.	Catastrophic,
W74-01288 2K	W74-01485 5D	W74-01193 2L

POLLUTANT IDENTIFICATION

POLAND	Heavy Metals in Wastewater and Treatment	Determination of Chlorinated Pesticides in
Occurrence and Cumulation of Microcom- ponents in Bottom Sediments of Dam Reser-	Plant Effluents, W74-01319 5A	Whole Blood, W74-01417 5A
voirs of Southern Poland, W74-01565 5B	Improved Distillation Method for Volatile	Determination of Meleic Hydrazide Residues in
	Acids Analysis,	Tobacco and Vegetables,
POLAND (CRACOW-CZESTOCHOWA	W74-01322 5A	W74-01418 5A
UPLAND) Diatoms of the Upper Course of the Stream	Literature on Mercury: Availability of English	The Determination of Organo-Sulfur Com-
Sanka (Cracow-Czestochowa Upland), (In	Translations,	pounds by Thin-Layer Chromatography Via a
Polish),	W74-01323 5A	Ligand-Exchange Precess,
W74-01258 2I	Wastewater Characterization of Sweet Potato	W74-01439 5A
POLAND (CZARCIE LAKE)	Processing,	Study of Chelated Mixtures of Ferric Ions with
Batrachospermum Vagum Ag. in the Szczecin	W74-01324 5A	Nitrilotriacetic, Sulfo-5-Salicylic and
Pomerania, A Locality New to Poland, (In	The Importance of Chelating Agents in Natural	Pyrocatechol-3,5-Disulfonic Acids, (In French),
Polish),	Waters and Wastewaters.	W74-01440 5A
W74-01219 2H	W74-01326 5B	The Determination of Cadmium by Atomic Ab-
POLAND (LAKE JEZIORAK)	Chemical Constants of Metal Complexes from	sorption in Air, Water, Sea Water and Urine
Production of Crustacean Zooplankton in Moty	a Complexometric Titration Followed with	with a R.F. Carbon Bed Atomizer, W74-01441 5A
Bay, Lake Jeziorak: II. Estimation of Produc-	Anodic Stripping Voltammetry,	W/4-01441
tion of the Predominating Species, W74-01173 2H	W74-01332 5A	Computer Identification of Bacteria on the
W/4-011/3	Solvent Extraction of Metal 1,10-	Basis of Their Antibiotic Susceptibility Pat-
POLAND (LAKE JEZIORAKE)	Phenanthroline Complexes and Concentration	terns, W74-01443 5A
Production of Crustacean Zooplankton in Moty	of Trace Amounts of Metal Ions Prior to Spec-	
Bay, Lake Jeziorak: The method of Production Estimation,	trophotometric or Flame Photometric Deter-	Soluble Aluminum in Marine and Fresh Water
W74-01172 2H	mination,	by Gas-Liquid Chromatography,
	W74-01354 5A	W74-01446 5A
POLAND (MASURIAN LAKE DIST.)	Determination of Low Concentrations of	Atomic Absorption Method for Determining
Investigations on the Changes in the Content of Heavy Metals in Lake Waters of the Masurian	Cobalt in Plant Material by Atomic Absorption	Micromolar Quantities of Aliphatic Secondary
Lake District,	Spectrophotometry,	Amines, W74-01492 5A
W74-01221 5B	W74-01356 2K	W /4-01492
BOT AND (LIBBOR VICTURA BINER)	Precolumn Inlet System for the Gas Chromato-	Analytical Methodology for Bioactive Com-
POLAND (UPPER VISTULA RIVER) Selected Species of Algae Found in Carp Ponds	graphic Analysis of Trace Quantities of Short-	pounds. Photochemically Assisted Analysis of
of the Laskowa Complex Near Zator,	Chain Aliphatic Amines,	Chlorinated Hydrocarbon Pesticides in the
W74-01607 2I	W74-01357 5A	Presence of Polychlorinated Biphenyls, W74-01493 5A
BOY I TIM A NIM TO DAMEDIC A MICON	A Systematic Study of the Variables Involved	
POLLUTANT IDENTIFICATION Evaluation of Flame Emission Determination	in the Reverse-Phase Thin-Layer Chromatog-	Gas-Solid Chromatography on Macroreticular
of Phosphorus in Water,	raphy of Oxyethylated Alkyl Sulfate Surfac- tants,	Cation Exchange Resins, W74-01495 5A
W74-01116 5A	W74-01358 5A	W14-01425
Italiantian of Demote Consine in Diver Paris		Ion Pair Partition Chromatography of Organic
Utilization of Remote Sensing in River Basin Studies,	A Procedure for the Estimation of Microgram	Ammonium Compounds, W74-01496 5A
W74-01154 5A	Quantities of Triton X-100, W74-01360 5A	W /4-01490
D		Infrared Studies of Chlorinated Dibenzo-p-
Determination of Griseofulvin by Time- Resolved Phosphorimetry,	Simultaneous Determination of Manganese,	Dioxins and Structurally Related Compounds,
W74-01224 5A	Copper, Arsenic, Cadmium, Antimony and Mercury in Glacial Ice by Radioactivation.	W74-01509 5A
	W74-01361 5A	Acridine Orange-Epifluorescence Technique
Application of Infrared Fourier Transform		for Counting Bacteria in Natural Waters,
Spectroscopy to Analysis of Micro Samples, W74-01303 2K	The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a	W74-01534 5A
	Atomic-Absorption Spectrometry with a Flameless Wire Loop Atomizer,	Studies on Methanol-Oxidizing Bacteria. I.
Microdetermination of Chloro-S-Triazines in	W74-01363 5A	Isolation and Growth Studies,
Soil by Gas-Liquid Chromatography with Nickel Electron Capture or Electrolytic Con-	Extraction-Photometric Determination of	W74-01535 5C
ductivity Detection,	Extraction-Photometric Determination of Uranium (IV) with Chlorophosphonazo-III,	Investigations on the Sheathed Bacterium
W74-01304 5A	W74-01364 5A	Haliscomenobacter hydrossis Gen.n., Sp.n.,
Natural Dispersion of Mercury from Puhipuhi,	Committee of Balantanahatan bar Baran Chan	Isolated from Activated Sludge,
Northland, New Zealand,	Separation of Polyphosphates by Paper Chro- matography with a New Solvent,	W74-01539 5B
W74-01307 5B	W74-01366 5A	Rhodopseudomonas Sulfidophila, Nov. Spec.,
m		A New Species of the Purple Nonsulfur Bac-
The Determination of Thallium in Urine and Plasma by Delves Cup Atomic Absorption,	Collaborative Study of a Colorimetric Method for Determining Arsenic Residues in Red Meat	teria, W74-01544 SB
W74-01314 5A	and Poultry,	
	W74-01403 5A	Emission Spectrometric Determination of
Determination of Mercury After Room Tem-	Panid Gas Chromatographic Mathed for Poten	Trace Metals in Biological Tissues, W74-01546 5A
perature Digestion by Flameless Atomic Ab- sorption,	Rapid Gas Chromatographic Method for Deter- mination of Residual Methanol in Sewage,	W74-01546 5A
W74-01315 5A	W74-01410 5A	Microbial Flora and Level of Vibric
		Parahaemolyticus of Oysters (Crassostrea Virginiae)
A Modified Filtration Method for the Analysis of Wastewater Suspended Solids,	Modified Delves Cup Atomic Absorption Determination of Lead in Blood,	ginica), Water and Sediment from Galvestor Bay,
W74-01318 SA	W74-01415 5A	W74-01548 50

POLLUTANT IDENTIFICATION

Litmus Milk Reaction as a Distinguishing Fea-	POTABLE WATER	PRICES
ture Between Streptococcus Faecalis of Human	Water. Examination. Assessment. Condition-	The Impact of Water Pollution Abatement on
and Non-Human Origins,	ing. Chemistry. Bacteriology. Biology,	Competition and Pricing in the Alabama Textile
W74-01549 5A	W74-01236 5F	Industry, W74-01101 5G
Shigella Sonnei Isolated from Well Water,	Fluorometric Determination of Selenium in	W/4-01101
W74-01551 5A	Water with 2,3-Diaminonaphthalene,	PRIMARY PRODUCTIVITY
Computer Identification of Yeasts of the Genus	W74-01399 5A	Some Sources of Error in the 14C Method for
	Drinking Water,	Estimating Primary Productivity and Their
Saccharomyces, W74-01646 5A	W74-01466 5F	Relationship to Light Intensity During Incuba-
W/4-01040	W/4-01400 3F	tion,
POLLUTION	Shigella Sonnei Isolated from Well Water,	W74-01217 2H
Florida Pollution Statute Infringes Upon Exclu-	W74-01551 5A	Modifications in Filtration Methods for the
sive Federal Maritime Legislative Domain, The		Measurement of Inorganic C-14 Uptake by
American Waterways Operators, Inc. v.	POTAMOCYPRIS	Photosynthesizing Algae,
Askew, 335 F. Supp. 1241 (M.D. Fla).	Thermophilic Ostracod: Aquatic Metazoan with	W74-01425 5A
W74-01460 5G	the Highest Known Temperature Tolerance,	
POLLUTION ABATEMENT	W74-01327 5C	Coupling Carbon Flow Through Some Pelagic
The Impact of Water Pollution Abatement on	POTASSIUM	and Benthic Communities,
Competition and Pricing in the Alabama Textile	The Potentiometric Titration of Potassium in	W74-01437 5B
Industry,	Sea Water with a Valinomycin Electrode,	A Mathematical Model of Brimany Braductivity
W74-01101 5G	W74-01442 5A	A Mathematical Model of Primary Productivity
		and Limnological Patterns in Lake Mead, W74-01630 5C
Floodland and Shoreland Development Guide.	POTENTIOMETRIC TITRATION	30
W74-01483 4A	The Potentiometric Titration of Potassium in	PRODUCTION
Application of Mathematical Madelline to	Sea Water with a Valinomycin Electrode,	Production of Crustacean Zooplankton in Moty
Application of Mathematical Modelling to	W74-01442 5A	Bay, Lake Jeziorak: The method of Production
Water Quality Management, W74-01486 5B	POTOMAC RIVER	Estimation,
W/4-01480	A Study of Tidal Dispersion in the Potomac	W74-01172 2H
POLYCHLORINATED BIPHENYLS	River,	
Variation of Organochlorine Residue Levels	W74-01196 5B	Production of Crustacean Zooplankton in Moty
with Age in Gulf of St. Lawrence Harp Seals		Bay, Lake Jeziorak: II. Estimation of Produc-
(Pagophilus Groenlandicus),	POULTRY	tion of the Predominating Species, W74-01173 2H
W74-01300 5A	Collaborative Study of a Colorimetric Method	W/4-011/3
Applytical Mathedalass for Biocetics Com-	for Determining Arsenic Residues in Red Meat	PRODUCTION FUNCTIONS
Analytical Methodology for Bioactive Com- pounds. Photochemically Assisted Analysis of	and Poultry,	Economics of Resource Use on Sample Farms
Chlorinated Hydrocarbon Pesticides in the	W74-01403 5A	of Central Gujarat,
Presence of Polychlorinated Biphenyls,	POWER SUPPLIES	W74-01491 3F
W74-01493 5A	Choosing a Static Inverter System,	
	W74-01547 7B	PRODUCTIVITY
Distribution of (C-14) PCBs in Carp,		The Distribution, Composition and Biomass of
W74-01530 5C	POWERPLANTS	the Crustacean Zooplankton Population in
POMACE STILLAGE	Field and Experimental Studies on the Effects	Western Lake Superior, W74-01109 5C
Characterization and Treatability of Pomace	of a Power Station Effluent on Tubificidae	W/4-01109
Stillage,	(Oligochaeta, Annelida),	PROFILES
W74-01325 5A	W74-01312 5C	Stability and Reach Length in Water Surface
JA.	PRECIPITATION (ATMOSPHERIC)	Profile Determination,
PONDS	The Union of the Columbia River and the	W74-01152 2E
The Chemical Oxygen Demand of Waters and	Pacific Ocean General Features,	
Biological Materials from Ponds,	W74-01183 2L	PROJECT PLANNING
W74-01543 5C		A Hybrid Model for Irrigation Planning Using
POPLAR TREES	PRECIPITATION VARIABILITY	Chance Constrained Programming and
Leaves as Source of Phosphorus,	Precipitation Variability Over North Carolina,	Hydrologic Simulation, W74-01488 4B
W74-01407 5B	W74-01111 2B	48
W/4-0140/	PRESSURE GRADIENTS	PROTOZOA
POPULATION DYNAMICS	The Influence of Topography and Pressure	Effects of Protozoa on the Fate of Particulate
Population Dynamics of Pond Zooplankton, I.	Gradients on Shoaling in a Tidal Estuary,	Carbon,
Diaptomus pallidus Herrick,	W74-01204 2L	W74-01117 5C
W74-01502 5C		
BODE WATER	PRESSURIZED SEWERS	Protozoa from Blue Lake, Raoul Island,
PORE WATER Concentrations of Dissolved Forms of Fe, Mn,	Pressurized Sewer Collection Systems,	W74-01310 5C
and Cu in Marine Pore Waters of the Atlantic	W74-01286 5D	Growth Rates of Sediment-Living Marine
Basin (Kontsentratsii rastvorennykh form Fe,	PRETREATMENT	Protozoan as a Toxicity Indicator for Heavy
Mn, i Cu v morskikh, porovykh vodakh bas-	Dieldrin. Effects of Chronic Sublethal Expo-	Metals,
seyna Atlanticheskogo okeana),	sure on Adaptation to Thermal Stress in Fresh-	W74-01529 5A
W74-01392 2K	water Fish,	
	W74-01408 5C	PSEUDOLITHODERMA PARADOXUM
POROSITY		Sublittoral Benthic Marine Algae of Southern
Determination of the Total Storage Capacity of	PREVENTIVE MASTER PLANNING	Cape Cod and Adjacent Islands: Pseu-
the Cretaceous Sandstone Aquifers in South Dakota,	Storm Drainage and Flood Control for Metropolitan Denver.	dolithoderma Paradoxum Sp. Nov. (Raif- siaceae, Ectocarpales),
W74-01114 2F	W74-01475 4A	W74-01350 5A
••	70	JA.

PSEUDOMONAS	Distribution Studies of Radium and Other	Effects of Leaf-Footed Bugs on Mesquite
Studies of Rapid NTA-Utilizing Bacterial Mu-	Metallic Elements Between Thenoyl-	Reproduction,
tant,	trifluoroacetone in Methyl Isobutyl Ketone and	W74-01638 4A
W74-01348 5B	Aqueous Solutions, W74-01494 5A	RAPPAHANNOCK ESTUARY (VA)
PSEUDOMONAS PUTIDA	W/4-01454	Sediment Transport in a Coastal Plain Estuary,
The Effects of Bacteria on the Growth and	RADIOCHEMICAL ANALYSIS	W74-01185 2L
Reproduction of Oedogonium Cardiacum,	Distribution of (C-14) PCBs in Carp,	
W74-01422 5C	W74-01530 5C	RARE EARTH ELEMENTS
PRIDE TO MID AT THE	RADIUM	State of Rare Earth Elements in Surface
PUBLIC HEALTH Metabolic Effects of Drinking Brackish Water,	Distribution Studies of Radium and Other	Waters (O sostoyanii redkozemel'nykh elemen-
W74-01632 5C	Metallic Elements Between Thenovi-	tov v poverkhnostnykh vodakh),
W/4-01032	trifluoroacetone in Methyl Isobutyl Ketone and	W74-01395 2K
PUDDLING	Aqueous Solutions,	REAL TIME DATA
Effect of Puddling on Physical Properties of	W74-01494 5A	Near Real Time Water Resources Data for
Rice Soil,	m. a . cma	River Basin Management,
W74-01246 3F	RAIN GAGES	W74-01150 4A
PULP WASTES	Comparison of Gage and Radar Methods of Convective Precipitation Measurement,	
Fate of Lignin in Kraft Effluent Treatment,	W74-01149 2B	RECHARGE
W74-01320 5B		Underground Storage of Texas Playa Lake
35	Climatological Stations in California, 1971,	Waters by Injection Into the Ogallala Forma-
PULSE POLAROGRAPHY	W74-01383 7C	tion Under Moderate Pump Pressure,
Small-Volume Solid-Electrode Flow-Through	RAINBOW TROUT	W74-01627 4B
Electrochemical Cells. Preliminary Evaluation	Metabolism and Biliary Excretion of Sul-	RECHARGE WELLS
Using Pulse Polarographic Techniques,	fobromophthalein by Rainbow Trout (Salmo	Underground Storage of Texas Playa Lake
W74-01445 7B	Gairdneri),	Waters by Injection Into the Ogallala Forma-
PUMPING	W74-01411 5C	tion Under Moderate Pump Pressure,
Relationship of Pumping Lift to Economic Use		W74-01627 4B
of Groundwater for Irrigation,	Uptake of Methyl Mercuric Chloride and Mer-	
W74-01120 4B	curic Chloride by Trout: A Study of Uptake	RECORDERS
	Pathways into the Whole Animal and Uptake by Erythrocytes in Vitro,	Using Computers to Analyze Continuous Data,
PUMPS	W74-01412 5C	W74-01520 7C
Turbulent Fluid Friction of Rotating Disks, W74-01640 8C	W/4-01412 3C	RECREATION
W74-01640 8C	RAINFALL	Report of Attitudes and Opinions of Recrea-
PURITY	Precipitation Variability Over North Carolina,	tionists Towards Wild and Scenic Rivers: A
Criteria for Mycotoxin Standards,	W74-01111 2B	Case Study of the St. Joe River,
W74-01414 5A	RAINFALL DISTRIBUTION PATTERNS	W74-01102 6B
	Precipitation Variability Over North Carolina,	
QUANTITATIVE ANALYSIS	W74-01111 2B	Recreational Reuse of Municipal Wastewater,
Ion Pair Partition Chromatography of Organic		W74-01103 5D
Ammonium Compounds, W74-01496 5A	RAINFALL INTENSITY	A Bill to Establish in the State of California the
W/4-01450 3A	Comparison of Gage and Radar Methods of	Santa Monica Mountain and Seashore National
QUATERNARY ALKYLAMMONIUM IONS	Convective Precipitation Measurement,	Urban Park.
Ion Pair Partition Chromatography of Organic	W74-01149 2B	W74-01458 6E
Ammonium Compounds,	RAINFALL-RUNOFF RELATIONSHIPS	
W74-01496 5A	Numerical Simulation of the Rainfall-Runoff	RECREATION DEMAND
QUATERNARY PERIOD	Process on a Daily Basis,	Simulation of Water Recreation Users' Deci-
Quaternary Shorelines of the Seas of Okhotsk	W74-01127 2A	sions,
and Japan (Chetvertichnyye beregovyye linii	Development of A Concentral Deterministic	W74-01464 6D
Okhotskogo i Yaponskogo morey),	Development of A Conceptual Deterministic Rainfall-Runoff Model,	Valuation of Visual-Cultural Benefits from
W74-01391 2J	W74-01128 2A	Freshwater Wetlands in Massachusetts,
OTINA THE A PRINT A NAME TO A		W74-01643 6B
QUNATITATIVE ANALYSIS	Hydrodynamic Modeling of Two-Dimensional	
Quantitative Analysis of Aqueous	Watershed Flow,	RECREATION FACILITIES
Nitrite/Nitrate Solutions by Infrared Internal Reflectance Spectrometry,	W74-01278 2A	Concept-Scale Interaction with the Semantic
W74-01402 2K	RALEIGH BAY (N.C.)	Differential Technique,
	The Circulation of Surface Waters in Raleigh	W74-01644 6B
RADAR	Bay, North Carolina,	RED TIDE
Comparison of Gage and Radar Methods of	W74-01210 2L	Probable Causes for the 1972 Red Tide in the
Convective Precipitation Measurement,	DAMAN CRECTROCCOPY	Cape Ann Region of the Gulf of Maine,
W74-01149 2B	RAMAN SPECTROSCOPY Novel Method of Raman Data Acquisition,	W74-01435 5C
RADIOACTIVE WELL LOGGING	W74-01330 2K	
Prediction of Well Development Possibilities in		RED WATER
Delaware by means of Calibrated Gamma-Ray		A First Record of Red-Water Phenomenon in
	RANDOLPH COUNTY (ILL)	
Logs,	Comprehensive Water and Sewer Plan, Ran-	Kashmir, India,
Logs, W74-01106 4B	Comprehensive Water and Sewer Plan, Ran- dolph County, Illinois.	
W74-01106 4B	Comprehensive Water and Sewer Plan, Ran-	Kashmir, India,
	Comprehensive Water and Sewer Plan, Ran- dolph County, Illinois.	Kashmir, India, W74-01564 5C
W74-01106 4B RADIOACTIVITY TECHNIQUES	Comprehensive Water and Sewer Plan, Randolph County, Illinois. W74-01474 5D	Kashmir, India, W74-01564 5C REED SWAMP PLANTS Growth Rate and Development of the Root/Shoot Ratio in Reedswanp Macrophytes
W74-01106 4B RADIOACTIVITY TECHNIQUES Simultaneous Determination of Manganese,	Comprehensive Water and Sewer Plan, Ran- dolph County, Illinois. W74-01474 5D RANGE MANAGEMENT	Kashmir, India, W74-01564 5C REED SWAMP PLANTS Growth Rate and Development of the

REEFS

Effects of Reefs and Bottom Slopes on Wind	W74-01164 3F	Some Consequences of an Inertia of Turbu
Set-Up in Shallow Water,		lence in a Tidal Estuary,
W74-01182 2J	Land Use and Mapping, W74-01165 4A	W74-01648 2I
REGIONAL ANALYSIS	W/4-01105	RHEOLOGY
Water Quality Evaluation of Regionalized	Mineral Resources, Geological Structure and	Flow of a Valley Glacier with a Solid Friction
Wastewater Systems,	Landform Surveys,	Law,
W74-01107 5D	W74-01166 7C	W74-01377 20
Objective Regionalization of Peak Flow Rates,	Environment Surveys,	
W74-01174 4D	W74-01167 5A	RHODOPHYTA
Availability of Presh Water in the Fast Central	Water Resources,	Physiological Ecology of Gelidiella Aceros (Forsskal) Feldmann et Hamel,
Availability of Fresh Water in the East Central Florida Planning Region.	W74-01168 7C	
W74-01481 6D		•
	Marine Resources and Ocean Surveys,	Algal Succession on Artificial Reefs in
Regional Water Resources Studies A Spanish Experience,	W74-01169 7B	Marine Lagoon Lavaonnen in Cuam,
W74-01622 4B	Interpretation Techniques Development,	W74-01429 50
	W74-01170 7B	RHODOPSEUDOMONAS SULFIDOPHILA
REGIONAL DEVELOPMENT	Multidisciplinary/Regional Resource Surveys,	Rhodopseudomonas Sulfidophila, Nov. Spec.
International Scientific and Technical Coopera-	W74-01171 7B	A New Species of the Purple Nonsulfur Bac
tion in the Field of Water Problems (Mezhdu- narodnoye nauchno-tekhnicheskoye sotrud-	W/4-011/1	teria,
nichestvo v oblasti vodnykh problem),	Tidewater Shorelines in Broward and Palm	W74-01544 51
W74-01138 6E	Beach Counties, Florida: An Analysis of	
Water Master Dies Russes Corinefield III-	Characteristics and Changes Interpreted from Color, Color Infrared and Thermal Aerial	
Water Master Plan. Eugene-Springfield Ur- banizing Area.	Imagery,	Rice Soil.
W74-01479 3D	W74-01220 2L	W74-01246 3
REGIONAL ECONOMICS	Techniques for Measuring Light Absorption Scattering, and Particle Concentrations in	
Impact of Irrigation Investments on Regional and Urban Development,	Water,	
W74-01625 6B	W74-01283 7B	River Bar (Metod prognoza pereformirovani rechnogo bara),
		W74-01388
REGIONAL FLOOD	REPRODUCTION Emergence, Reproduction, and Growth of	
Areas of Possible Flooding in Knox County, Tennessee,	Setipalpian Plecoptera in Southern Ontario,	RIVER BASIN COMMISSIONS
W74-01269 7C	W74-01359 5A	A Bill to be Known as the 'River Basin Wast
		Treatment Authority Act of 1973'. W74-01614
REGIONAL PLANNING	The Effects of Bacteria on the Growth and	W 74-01014
Storm Drainage and Flood Control for Metropolitan Denver.	Reproduction of Oedogonium Cardiacum, W74-01422 5C	RIVER BASIN DEVELOPMENT
W74-01475 4A	***************************************	Utilization of Remote Sensing in River Basi
	RESERVOIR SILTING	Studies,
REGIONAL WASTE WATER SYSTEMS	Mohawk Lake Study, Brantford, Ontario. W74-01476	W74-01154 5.
Water Quality Evaluation of Regionalized Wastewater Systems,	W74-01476 2J	River Basin Planning in the United States,
W74-01107 5D	RESOURCE USE	W74-01472 6
	Economics of Resource Use on Sample Farms	
REGRESSION ANALYSIS	of Central Gujarat,	Storm Drainage and Flood Control for
Objective Regionalization of Peak Flow Rates,	W74-01491 3F	Metropontan Denver.
W74-01174 4D	RESPIRATION	W74-01475 4.
Coupling Carbon Flow Through Some Pelagic	Studies of Rapid NTA-Utilizing Bacterial Mu-	RIVER BASINS
and Benthic Communities,	tant,	And Not a Drop to Drink: Water Resource
W74-01437 5B	W74-01348 5B	Planning and Administration,
Extended Tables for Kendall's Tau,	RESPIROMETERS	W74-01465 6
W74-01497 7C	Food Consumption of the Free-Living Aquatic	RIVER FLOW
REGULATION	Nematode Pelodera Chitwoodi, W74-01225 5A	mt. I di d m t n
Inventory and Evaluation of Information on	W74-01225 5A	Gradients on Shoaling in a Tidal Estuary,
Delaware Bay, Volume 2.	An Oxygen Electrode Microrespirometer,	W74-01204 2
W74-01369 6E	W74-01419 5A	
REMOTE SENSING	RETENTION TIME	RIVER ITCHEN (HAMPSHIRE-ENGLAND)
Near Real Time Water Resources Data for	Herbicide Analysis: Relationship Between	Application of Mathematical Modelling (Water Quality Management.
River Basin Management,	Molecular Structure and Retention Index,	W74-01486
W74-01150 4A	W74-01416 5A	
Utilization of Remote Sensing in River Basin	RETURN (MONETARY)	RIVERS
Studies,	Economics of Resource Use on Sample Farms	On the Vertical Structure of Tidal Flow
W74-01154 5A	of Central Gujarat,	River Estuaries, W74-01205
Symposium on Significant Results Obtained	W74-01491 3F	W74-01205
from Earth Resources Technology Satellite-1,	REVEGETATION	RIVERS SYSTEMS
March 5-9, 1973: Volume IIIDiscipline Sum-	Brush Eradicating, Basin Pitting, and Seeding	
mary Reports.	Machine for Arid to Semiarid Rangeland,	of Wild and Scenic Rivers System.
W74-01163 7C	W74-01637	W74-01619 6

	CALINE WATER PRESTULATED INTERPACES	CAMPI P PREPARATION
ROBBINSVILLE	SALINE WATER-FRESHWATER INTERFACES	SAMPLE PREPARATION
Tallulah Creek Watershed (Long Creed Por-	Recognition of Natural Brine by Electrical	Determination of Mercury After Room Tem-
tion) Graham County, North Carolina (Final	Soundings Near the Salt Fork of the Brazos	perature Digestion by Flameless Atomic Ab-
Environmental Impact Statement).	River, Kent and Stonewall Counties, Texas,	sorption,
W74-01621 4D	W74-01370 2F	W74-01315 5A
	SALINE WATER INTRUSION	Phonometric Questitation of Callings in Biolog
ROLLING PLAINS (TEXAS)		Phorometric Quantitation of Gallium in Biolog-
Effects of Leaf-Footed Bugs on Mesquite	Oxnard Basin Experimental Extraction-Type	ical Materials at Nanogram Levels,
Reproduction,	Barrier,	W74-01344 2K
W74-01638 4A	W74-01289 8B	01-181-1 0
	20 4 PH W. D. 1 - C	Simplified Spectrophotometric Analysis of
ROMANIA (DANUBE RIVER)	Murfee v. Phillips Petroleum Company (Action	Plants for Selenium,
Bryocenological Research in Some Areas of the	by Property Owners Against Oil and Gas Les-	W74-01406 2K
Iron Gate of the Danube, (In Rumanian),	sees for Diminution of Market Value of Land	Deliability of an Ammonia Broke for Elec
W74-01453 2I	Due to Pollution of Underground Fresh Water	Reliability of an Ammonia Probe for Elec-
W/4-01433	Supply).	trometric Determination of Total Ammonia
ROOT/SHOOT PRODUCTIVITY	W74-01459 6E	Nitrogen in Fish Tanks,
Desert Dogma Reexamined: Root/Shoot		W74-01433 5A
	SALINITY	Microbial Culture Media Preparation,
Productivity and Plant Spacing,	Investigations on the Influence of Tides on	
W74-01585 2I	Salinity, Content of Suspended Matter, Sedi-	W74-01505 5A
	mentation and Bacteria Counts in the Elbe	CAMPI INC
ROOT/SHOOT RATIO	Estuary, (Untersuchungen Uber Die Einwir-	SAMPLING
Growth Rate and Development of the	kung Der Tide Auf Salzgehalt, Schwebstoff-	Application of Infrared Fourier Transform
Root/Shoot Ratio in Reedswanp Macrophytes	gehalt, Sedimentation Und Bakteriengehalt in	Spectroscopy to Analysis of Micro Samples,
Grown in Winter Hydroponic Cultures,	Der untereibe),	W74-01303 2K
W74-01346 2I	W74-01175 2L	
	W/4-011/3	Automatic Samplers for Sewage and Effluents,
ROOT ZONE	On Structure, Entrainment, and Transport in	W74-01306 5A
Soil Salinization Under Irrigated Cultivation,	Estuarine Embayments,	
and the second s	W74-01178 2L	Phytoplankton of the Czechoslovak Sector of
W74-01238 3F	W/4-011/6 2L	the Danube and of the Estuaries of the Prin-
BOOTED HOLLATIC BLANKS	Tidal Period Oscillations of an Isohaline Sur-	cipal Tributaries on Czechoslovak Territory,
ROOTED EQUATIC PLANTS	face Off the Mouth of the Columbia River,	(In Czect.),
Element Constitution of Selected Aquatic	W74-01188 2L	W74-01371 2I
Vascular Plants from Pennsylvania: Submersed	W/4-01100 2L	
and Floating Leaved Species and Rooted Emer-	Computer Simulation of Estuarial Networks,	SAN DIEGO COUNTY (CALIF)
gent Species,	W74-01197 2L	Tri-Agencies Pipeline: Engineering Report.
W74-01526 5A	W/4-0119/	W74-01477 8A
	Physiological Ecology of Gelidiella Acerosa	
ROTAMETERS	(Forsskal) Feldmann et Hamel,	SAND BARS
Rotameter.	W74-01424 5C	Alluvion, Islands, and Sand Bars,
	W/4-01424 3C	W74-01612 6E
W74-01500 7B	Salinity Adaptation by Dunaliella Tertiolecta. I.	
ROTATIONAL FLOW	Increases in Carbonic Anhydrase Activity and	SAND DEPOSITS
		The Effect of Sand Deposition Upon the
Turbulent Fluid Friction of Rotating Disks,	Evidence for a Light-Dependent Na (Plus)/H	Macro-Invertebrate Fauna of the River Camel,
W74-01640 8C	(Plus) Exchange,	Cornwall,
	W74-01427 5C	W74-01244 2I
ROTIFERS	Variouslan Water of the Yadaa Mains and Their	W/4-01244 21
Zooplankton in Kolyma-Indigirka Lakes (In	Irrigation Waters of the Indus Plains and Their	SANDS
Russian),	Salt Load,	Sand Beach Bacteria: Enumeration and
W74-01341 2H	W74-01639 3C	Characterization,
-	CATAON COCKING	
RUNOFF	SALMON STOCKING	W74-01444 5A
Division of the United States into Regions Ac-	Further Studies of Fish Predation on Salmon	Experimental Establishment of Eccest Plants
cording to Cophasal Fluctuations of Annual	Stocked in Maine Lakes,	Experimental Establishment of Forest Planta-
	W74-01603 2H	tions on Sands, in Accordance with the Idea of
Runoff (Rayonirovaniye territorii SShA po sin-		G. N. Vysotskii (In Russian),
faznosti kolebaniy godovogo stoka rek),	SALMONELLA	W74-01569 21
W74-01140 2E	Relationships of Indicator and Pathogenic Bac-	SANDSTONES
	teria in Stream Waters,	
SACCHAROMYCES SPP	W74-01645 5B	Determination of the Total Storage Capacity of
Computer Identification of Yeasts of the Genus		the Cretaceous Sandstone Aquifers in South
Saccharomyces,	SALTATION	Dakota,
W74-01646 5A	Experimental Investigation of the Effect of Sal-	W74-01114 2F
	tating Sediments on Kinematics of Flow (Ek-	ALVEN BOOK AIR
SACRAMENTO-SAN JOAQUIN RIVER (CALIF)	sperimental'noye issledovaniye vliyaniya sal'-	SANDY HOOK (NJ)
Computer Simulation of Estuarial Networks,	tiruyushchikh nanosov na kinematiku potoka),	Experiments and Hydrographic Surveys Off
W74-01197 2L	W74-01134 2J	Sandy Hook, New Jersey (1963),
4L		W74-01199 2L
SALINE SOILS	SALTS	
Irrigation Waters of the Indus Plains and Their	Transient Movement of Water and Solutes in	SARGASSO SEA
Salt Load.	Unsaturated Soil Systems,	Kinetics of Silicon-Limited Growth in the
	W74-01104 2G	Marine Diatom Thalassiosira pseudonana Hasle
W74-01639 3C		and Heimdal (Equals Cyclotella Nana Hustedt),
CATIND WATER	Descrption and Dissolution of Salts from Soils	W74-01431 50
SALINE WATER	as a Function of Soil Water Ratio,	
Regional Estimate of Brackish- and Saline-	W74-01604 2G	SARGASSUM HAWAIIENSIS
Groundwater Yield (Regional'naya otsenka		New Records of Sargassum Hawaiiensis Doty
ekspluatatsionnykh resursov solonovatykh i	Irrigation Waters of the Indus Plains and Their	and Newhouse (Sargassaceae, Phaeophyta), a
solenykh podzemnykh vod),	Salt Load,	Deep Water Species,
W74-01137 4B	W74-01639 3C	W74-01349 21

SATELLITES (ARTIFICIAL)

SATELLITES (ARTIFICIAL) Symposium on Significant Results Obtained	SEA OF JAPAN Ouaternary Shorelines of the Seas of Okhotsk	Investigations on the Influence of Tides on Salinity, Content of Suspended Matter, Sedi-
from Earth Resources Technology Satellite-1,	and Japan (Chetvertichnyye beregovyye linii	mentation and Bacteria Counts in the Elbe
March 5-9, 1973: Volume IIIDiscipline Sum-	Okhotskogo i Yaponskogo morey),	Estuary, (Untersuchungen Uber Die Einwir-
mary Reports.	W74-01391 2J	kung Der Tide Auf Salzgehalt, Schwebstoff-
W74-01163 7C		gehalt, Sedimentation Und Bakteriengehalt in
Agriculture, Forestry, Range Resources,	SEA OF OKHOTSK Quaternary Shorelines of the Seas of Okhotsk	Der unterelbe), W74-01175 2L
W74-01164 3F	and Japan (Chetvertichnyye beregovyye linii Okhotskogo i Yaponskogo morey),	A Profile of the Four Moment Measures Per-
Land Use and Mapping,	W74-01391 2J	pendicular to a Shore Line, South Haven,
W74-01165 4A		Michigan,
44	SEA WATER	W74-01184 2H
Mineral Resources, Geological Structure and	Oxnard Basin Experimental Extraction-Type	Codinger Toursest in a Constal Blair Estuary
Landform Surveys,	Barrier,	Sediment Transport in a Coastal Plain Estuary,
W74-01166 7C	W74-01289 8B	W74-01185 2L
	The Potentiometric Titration of Potassium in	Littoral Zone Tidal-Cycle Sedimentation,
Environment Surveys,	Sea Water with a Valinomycin Electrode,	W74-01192 2J
W74-01167 5A	W74-01442 5A	
		Shoreline Processes Near Barrow, Alaska: A
Water Resources,	Soluble Aluminum in Marine and Fresh Water	Comparison of the Normal and the
W74-01168 7C	by Gas-Liquid Chromatography,	Catastrophic,
	W74-01446 5A	W74-01193 2L
Marine Resources and Ocean Surveys,		
W74-01169 7B	Marine Pollution: A Critique of Present and	Beach Equilibrium and Second-Order Wave
	Proposed International Agreements and Institu-	Theory,
Interpretation Techniques Development,	tionsA Suggested Global Oceans' Environ-	W74-01201 2E
W74-01170 7B	mental Regime,	Littoral Processes and the Development of
	W74-01449 5G	Shorelines.
Multidisciplinary/Regional Resource Surveys,	Silica Gel Medium for Enumeration of Petrole-	W74-01212 2J
W74-01171 7B	umlytic Microorganisms in the Marine Environ-	
	ment,	Sand Movement Along Equilibrium Beaches
SAVANNAH RIVER (GEO)	W74-01532 5A	North of San Francisco,
Stratigraphy and Economic Geology of the		W74-01213 2J
Coastal Plain of the Central Savannah River	SEASONAL	
Area, Georgia,	The Union of the Columbia River and the	A Role of Sediment Transport in Alluvial Chan-
W74-01122 2J	Pacific Ocean General Features,	nels,
	W74-01183 2L	W74-01272 2J
SCANNING SPECTROPHOTOMETER		Analysis of Sediment Sorting in Alluvial Chan-
Automated Rapid Scan Instrument for Spec-	SEASONAL VARIATION	nels,
troelectrochemistry in the Visible Region,	Seasonal Variation of Chemical Parameters in	W74-01274 2J
W74-01331 2K	Alaskan Tundra Lakes,	
SCHOOLS (EDVICATION)	W74-01347 5B	Sediment Transport: New Approach and Anal-
SCHOOLS (EDUCATION)	Microfauna of Activated Sludge. Part III. The	ysis,
Educational Programs for Land and Water	Effect of Physico-Chemical Factors on the Oc-	W74-01279 2J
Resources Development and Management,	currence of Microfauna in the Annual Cycle,	
W74-01628 6B	W74-01542 5C	Observations of Net Shoreline Positions and
SCINTILLATION COUNTING		Approximations of Barrier Island Sediment
Distribution of (C-14) PCBs in Carp,	SEAWEEDS (PACIFIC OCEAN)	Budgets, W74-01372 2L
	Concentrations of Plutonium, Cobalt, and	W /4-013/2 ZL
W74-01530 SC	Silver Radionuclides in Selected Pacific	A Method of Forecasting the Building of a
SCIOTO RIVER (OHIO)	Seaweeds,	River Bar (Metod prognoza pereformirovaniy
Sr-87/Sr-86 Ratios and Total Strontium Con-	W74-01297	rechnogo bara),
centrations in Surface Waters of the Scioto	CEDIMENT DICCHARCE	W74-01388 2J
River Drainage Basin, Ohio,	SEDIMENT DISCHARGE	
W74-01516 5B	A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy	SEDIMENT-WATER INTERFACES
W/4-01510	rechnogo bara),	A Study of the Exchange of Dissolved Solids
SCOLECITHRICELLA	W74-01388 2J	Between Bottom Sediments and Water of Dif-
Revision of Family and Some Generic Defini-	W/4-01300	ferent Water Bodies (Izucheniye obmena rast-
tions in the Phaennidae and Scolecithricidae	SEDIMENT REMOVAL	vorennymi veshchestvami mezhdu donnymi ot-
(Copepoda: Calanoida),	Mohawk Lake Study, Brantford, Ontario.	lozheniyami i vodoy razlichnykh vodoyemov),
W74-01308 5A	W74-01476 2J	W74-01389 2J
		SEDIMENTATION
SCOTLAND (FLANDERS MOSS)	SEDIMENT SORTING	Sedimentation in a Meandering Estuary,
Soil Aeration Response to Draining Intensity in	Analysis of Sediment Sorting in Alluvial Chan-	W74-01177 2L
Basin Peat,	nels,	
W74-01255 2G	W74-01274 2J	Beach Cusps,
	SEDIMENT TRANSPORT	W74-01180 21
SEA ICE	Cohesionless, Fine Graded, Flaked Sediment	Littoral Zone Tidel Contract Continues at
The Mass Balance of the Sea Ice of the Arctic	Transport by Water,	Littoral Zone Tidal-Cycle Sedimentation,
Ocean,	W74-01125 2J	W74-01192 2J
W74-01374 2C		The Equilibrium Beach,
	Experimental Investigation of the Effect of Sal-	W74-01195 21
SEA NETTLES	tating Sediments on Kinematics of Flow (Ek-	
Biochemistry of Estuarine Ecosystem with	sperimental'noye issledovaniye vliyaniya sal'-	Tidal Cycle of Changes in an Equilibrium
Emphasis on Heavy Metals and Shellfish,	tiruyushchikh nanosov na kinematiku potoka),	Beach, Sandy Hook, New Jersey,
W74-01108 5C	W74-01134 2J	W74-01198 2L

Beach Equilibrium and Second-Order Wave Theory, W74-01201 2E	Gas-Liquid Chromatographic Determination of Chlorpyriphos in Dursban Insecticide Formula- tions,	SEWAGE MICROORGANISMS Microfauna of Activated Sludge. Part III. The Effect of Physico-Chemical Factors on the Oc-
	W74-01405 5A	currence of Microfauna in the Annual Cycle,
The Influence of Topography and Pressure Gradients on Shoaling in a Tidal Estuary, W74-01204 2L	The Determination of Organo-Sulfur Com- pounds by Thin-Layer Chromatography Via a	W74-01542 5C
W/4-01204	Ligand-Exchange Precess,	SEWAGE TREATMENT Pressurized Sewer Collection Systems,
SEDIMENTS Mercury in the EnvironmentA Global Review	W74-01439 5A	W74-01286 5D
Including Recent Studies in the Delaware Bay Region,	Sand Beach Bacteria: Enumeration and Characterization,	Fate of Lignin in Kraft Effluent Treatment, W74-01320 5B
W74-01373 5B	W74-01444 5A	
Coupling Carbon Flow Through Some Pelagic	Ion Pair Partition Chromatography of Organic	SEWERAGE
and Benthic Communities, W74-01437 5B	Ammonium Compounds, W74-01496 5A	Pressurized Sewer Collection Systems, W74-01286 5D
Occurrence and Cumulation of Microcom-	Virus Concentration from Sewage,	Functional Water and Sewerage Plan and Pro-
ponents in Bottom Sediments of Dam Reservoirs of Southern Poland.	W74-01533 5D	gram. W74-01469 5D
W74-01565 5B	Litmus Milk Reaction as a Distinguishing Fea-	Relating Comprehensive Sewer and Water
SEICHES	ture Between Streptococcus Faecalis of Human and Non-Human Origins,	Plans to the County Land Use Plan. Goals, Policies and Standards.
Currents at Toledo Harbor, W74-01214 2H	W74-01549 5A	W74-01473 5D
	SEPTIC TANKS	
SEISMIC STUDIES Seismic Evidence for Glacier Motion,	Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee,	Comprehensive Water and Sewer Plan, Ran- dolph County, Illinois.
W74-01378 2C	W74-01145 7C	W74-01474 5D
SELENIUM	Improved Waste Disposal Unit,	Utility Provisions Analysis for East Central
Prevention of Selenium Interference with Mea- surement of Phosphate as its Molybdenum (V-	W74-01284 5D	Florida. W74-01480 6D
VI) Complex, W74-01345 5A	SERUM	
W/4-01343 3A	Simple Inexpensive Freeze-Drying Procedure,	SEWERS Pressurized Sewer Collection Systems,
Fluorometric Determination of Selenium in	W74-01339 7B	W74-01286 5D
Water with 2,3-Diaminonaphthalene, W74-01399 5A	SEWAGE	
	Virus Concentration from Sewage,	SHAD (ALABAMA) Biology of the Alabama Shad in Northwest
Simplified Spectrophotometric Analysis of	W74-01533 5D	Florida,
Plants for Selenium, W74-01406 2K	Biodegradation of O-Benzyl-P-Chlorophenol,	W74-01248 21
	W74-01552 5B	SHADING
SEMIARID CLIMATES Brush Eradicating, Basin Pitting, and Seeding	The Action of Mineral Fertilization on Pasture	Effects of Shading and of Seasonal Differences
Machine for Arid to Semiarid Rangeland, W74-01637 4A	Herbage, Irrigated with Sewage, (In Russian), W74-01559 5D	in Weathering on the Growth, Sugar Content and Sugar Yield of Sugar Beet Crops,
CRANING CRAIL DI POTRO ANA I VOIC	SEWAGE BACTERIA	W74-01229 3F
SEMIINTEGRAL ELECTROANALYSIS Semiintegral Electroanalysis: Shapes of	Investigations on the Sheathed Bacterium	SHALLOW WATER
Neopolarograms,	Haliscomenobacter hydrossis Gen.n., Sp.n.,	Note on the Equations of Long Waves Over an
W74-01333 5A	Isolated from Activated Sludge, W74-01539 5B	Uneven Bottom,
SENSITIVITY		W74-01189 2E
Sensitivity of Three Selected Bacterial Species	Bacteriology of Activated Sludge, in Particular	Harbor Analog System, Part I - Waves,
to Ozone, W74-01553 5F	the Filamentous Bacteria, W74-01540 5B	W74-01200 2L
W/4-01333		Edge Waves Over a Sloping Beach in a Rotat-
SENSORS	SEWAGE DISPOSAL Improved Waste Disposal Unit,	ing Two-Layered System,
Glass-Metal Composite Electrodes, W74-01512 2K	W74-01284 5D	W74-01218 2E
CERABATION TECHNIQUES	A Growing Community: 1973 Update, (Lexing-	Longshore Current Generation by Obliquely In-
SEPARATION TECHNIQUES Vortex Concept for Separating Oil from Water,	ton, Kentucky).	cident Internal Waves,
W74-01148 5G	W74-01484 5D	W74-01650 2E
Solvent Extraction of Metal 1,10-	SEWAGE DISTRICTS	SHIGELLA SONNEI
Phenanthroline Complexes and Concentration	Sketch Development Plan, Chambers County,	Shigella Sonnei Isolated from Well Water,
of Trace Amounts of Metal Ions Prior to Spec-	Alabama.	W74-01551 5A
trophotometric or Flame Photometric Deter- mination,	W74-01485 5D	SHIPS
W74-01354 5A	SEWAGE EFFLUENTS	Vortex Concept for Separating Oil from Water,
	Automatic Samplers for Sewage and Effluents,	W74-01148 5G
A Systematic Study of the Variables Involved in the Reverse-Phase Thin-Layer Chromatog-	W74-01306 5A	SHOALING
raphy of Oxyethylated Alkyl Sulfate Surfac-	Heavy Metals in Wastewater and Treatment	Beach Changes on the Outer Banks of North
tants,	Plant Effluents, W74-01319 5A	Carolina, W74-01179 2E
W74-01358 5A	W/4-01319 3A	
Separation of Polyphosphates by Paper Chro-	Rapid Gas Chromatographic Method for Deter-	Note on the Equations of Long Waves Over as Uneven Bottom.
matography with a New Solvent, W74-01366 5A	mination of Residual Methanol in Sewage, W74-01410 5A	W74-01189 2E

a.

SHOALING

The Influence of Topography and Pressure Gradients on Shoaling in a Tidal Estuary, W74-01204 2L	and Economic Effects of Weather Forecasting and Weather Modification: Summary Report, W74-01463	SNOWMELT Development of a Time-Space Prediction Technique to Evaluate Snowpacks in and Ad-
Observations and Experiments on Solitary	Simulating the Behavior of a Multi-Unit, Multi-	jacent to Forest Openings, W74-01231 3B
Wave Deformation, W74-01215 8B	Purpose Water-Resource System, W74-01468 6A	Short-Term Snow Melt and Ablation Derived
SHOALS		from Heat- and Mass-Balance Measurements,
SHOALS Sediment Transport in a Coastal Plain Estuary,	SIMULIIDAE	W74-01380 2C
W74-01185 2L	Number and Size of Drifting Nymphs of	ONORED A CIPO
W/4-01105	Ephemeroptera, Chironomidae, and Simulidae	SNOWPACKS Comparison of the Snow Resistograph with the
SHORE PROTECTION	by Day and Night in the River Stranda, Western Norway,	Ram Penetrometer,
The Equilibrium Beach,	W74-01230 2I	W74-01381 2C
W74-01195 2J		
SHORELAND MANAGEMENT	SINKS	SOCIAL ASPECTS
Floodland and Shoreland Development Guide.	Areas with Abundant Sinkholes in Knox Coun-	Consolidation of Irrigation Systems: Phase 1,
W74-01483 4A	ty, Tennessee,	Engineering, Legal, and Sociological Con-
	W74-01270 7C	straints and/or Facilitators, W74-01367 3F
SHORES	SIZE	W/4-0130/
Tidewater Shorelines in Broward and Palm	Relation Between Total Body Weight and Con-	SOCIAL SCIENCES
Beach Counties, Florida: An Analysis of Characteristics and Changes Interpreted from	centrations of Manganese, Iron, Copper, Zinc,	The Role of Universities in Water Resources
Color, Color Infrared and Thermal Aerial	and Mercury in White Muscle of Bluefish (Po-	Education: The Social Sciences,
Imagery,	matomus saltatrix) and A Bathyl-Dimersal Fish	W74-01467 6B
W74-01220 2L	Antimora Rostrata,	COCIAL WALLING
	W74-01413 5B	SOCIAL VALUES Valuation of Visual Cultural Bonefits from
Quaternary Shorelines of the Seas of Okhotsk		Valuation of Visual-Cultural Benefits from Freshwater Wetlands in Massachusetts,
and Japan (Chetvertichnyye beregovyye linii	SLOPES	W74-01643 6B
Okhotskogo i Yaponskogo morey), W74-01391 2J	Effects of Reefs and Bottom Slopes on Wind	W 14 01043
W74-01391 2J	Set-Up in Shallow Water, W74-01182 2J	Concept-Scale Interaction with the Semantic
SIEROZEMS	W/4-01182	Differential Technique,
Distribution Patterns and Population Dyanmics	Edge Waves Over a Sloping Beach in a Rotat-	W74-01644 6B
of the Micro-Arthropods of a Desert Soil in	ing Two-Layered System,	CODUM
Southern California,	W74-01218 2E	SODIUM Soliaity Adoptotion by Dynaliclla Testiclesta I
W74-01635 21		Salinity Adaptation by Dunaliella Tertiolecta. I. Increases in Carbonic Anhydrase Activity and
SILICA GEL MEDIUM	SNAILS	Evidence for a Light-Dependent Na (Plus)/H
Silica Gel Medium for Enumeration of Petrole-	Distribution of Alkyl Arsenicals in Model	(Plus) Exchange,
umlytic Microorganisms in the Marine Environ-	Ecosystem, W74-01409 5C	W74-01427 5C
ment,	W74-01409 5C	
W74-01532 5A	SNOW	SODIUM IONS
SILICATES	Use of Isotopic Methods to Determine Present	Prediction of the Variation in the Chemistry of
Kinetics of Silicon-Limited Growth in the	Rates of Snow Accumulation in Antarctica	a Lake Resulting from an Increase in Soluble
Marine Diatom Thalassiosira pseudonana Hasle	(Ispol'zovaniye izotopnykh metodov dlya	Deposits: Application: The Sodium in Lake Neuchatel,
and Heimdal (Equals Cyclotella Nana Hustedt),	opredeleniya sovremennoy skorsti nakopleniya	W74-01562 2H
W74-01431 5C	snega v Antarktide),	
	W74-01393 2C	SOIL AERATION
SILT	SNOW COVER	Soil Aeration Response to Draining Intensity in
Role of Silt in Microcystis Aeruginosa	Use of Isotopic Methods to Determine Present	Basin Peat,
Development, (In Russian), W74-01368 5C	Rates of Snow Accumulation in Antarctica	W74-01255 2G
117 01300	(Ispol'zovaniye izotopnykh metodov dlya	Nitrate Reduction in Soils: Effect of Soil
SILTING	opredeleniya sovremennoy skorsti nakopleniya	Moisture Tension,
Mohawk Lake Study, Brantford, Ontario.	snega v Antarktide),	W74-01583 2G
W74-01476 2J	W74-01393 2C	
SILVER	SNOW PACKS	SOIL AGGREGATION
Ion Selective Sensors,	Development of a Time-Space Prediction	Effect of Portland Cement on Soil Aggregation
W74-01506 5A	Technique to Evaluate Snowpacks in and Ad-	and Hydraulic Properties,
	jacent to Forest Openings,	W74-01576 2G
SILVER RADIONUCLIDES	W74-01231 3B	SOIL ANALYSIS
Concentrations of Plutonium, Cobalt, and		Microdetermination of Chloro-S-Triazines in
Silver Radionuclides in Selected Pacific Seaweeds.	SNOW PENETROMETER	Soil by Gas-Liquid Chromatography with
W74-01297	Comparison of the Snow Resistograph with the	Nickel Electron Capture or Electrolytic Con-
	Ram Penetrometer, W74-01381 2C	ductivity Detection,
SIMULATION ANALYSIS	W74-01381 2C	W74-01304 5A
Numerical Simulation of the Rainfall-Runoff	SNOW RESISTOGRAPH	SOIL CHEMICAL PROPERTIES
Process on a Daily Basis, W74-01127 2A	Comparison of the Snow Resistograph with the	Effect of the Quality of Well Waters on Soils in
7.7-VIII	Ram Penetrometer,	Gurgaon District,
Hydrodynamic Modeling of Two-Dimensional	W74-01381 2C	W74-01252 2G
Watershed Flow,	CNOWEIEI DC	CON OI ACCIDICATION
W74-01278 2A	SNOWFIELDS Spectral Absorption of Solar Radiation in Al-	SOIL CLASSIFICATION
Simulation Models for Water-Resource	pine Snowfields,	Soil Association Map of Knox County, Tennes- see.
Systems: Their Utility in Measuring Physical	W74-01626 2C	W74-01146 2C

SOIL CONSERVATION	SOIL WATER MOVEMENT	SOUTH DAKOTA
Soil and Water Conservation on Arable Lands,	Transient Movement of Water and Solutes in	Calculation of Permeability of Cretaceous
W74-01633 3F	Unsaturated Soil Systems,	Sandstones from Pumping and Static Level
	W74-01104 2G	Data in Selected Areas of Western South
SOIL DISPOSAL FIELDS		Dakota,
Categories of Relative Feasibility for Septic-	SOIL WATER RATIO	W74-01113 2F
Tank Filter Fields in Knox County, Tennessee,	Desorption and Dissolution of Salts from Soils	
W74-01145 7C	as a Function of Soil Water Ratio,	Determination of the Total Storage Capacity of
SOIL FILTERS	W74-01604 2G	the Cretaceous Sandstone Aquifers in South
Categories of Relative Feasibility for Septic-		Dakota,
Tank Filter Fields in Knox County, Tennessee,	SOILS	W74-01114 2F
W74-01145 7C	Water Requirements of Wheat and Cotton on a	
117-01175	High Water Table Soil Under Arid Conditions,	Nutrient Sources and Transport in the Upper
SOIL FORMATION	W74-01595 3F	and Central Regions of the Big Sioux River,
Soil Association Map of Knox County, Tennes-		W74-01115 5B
see.	SOLAR RADIATION	
W74-01146 7C	Spectral Absorption of Solar Radiation in Al-	SOUTH PLATTE RIVER VALLEY (COLO)
	pine Snowfields,	Hydrogeologic Characteristics of the Valley-
SOIL FROST GAGES	W74-01626 2C	Fill Aquifer in the Weldona Reach of the South
A Reliable and Inexpensive Soil Frost Gage,		Platte River Valley, Colorado,
W74-01574 2G	SOLID ELECTRODES	W74-01142 4B
	Small-Volume Solid-Electrode Flow-Through	
SOIL MECHANICS	Electrochemical Cells. Preliminary Evaluation	SOYBEAN HYPOCOTYLS
Study of Soil Plasticity over a wide Range of	Using Pulse Polarographic Techniques,	Sensitivity of Cell Division and Cell Elongation
Soil Moisture Contents,	W74-01445 7B	to Low Water Potentials in Soybean
W74-01636 2G		Hypocotyls,
SOIL MOISTURE	SOLID WASTES	W74-01249 3F
	Study of Water Recovery and Solid Waste	
Transient Movement of Water and Solutes in	Processing for Aerospace and Domestic Appli-	SOYBEAN LEAVES
Unsaturated Soil Systems,	cations: Volume 1 - Final Report Summary,	Stomatal-Diffusion Resistance and Water
W74-01104 2G	W74-01280 5D	Potential of Soybean and Sorghum Leaves,
Study of Soil Plasticity over a wide Range of		W74-01605 3F
Soil Moisture Contents,	A Cost-Effectiveness Study and Analysis of	W 74-01003
W74-01636 2G	Municipal Refuse Disposal Systems,	SOYBEANS
W/4-01036 2G	W74-01631 5E	Effect of Moisture Stress on Soybean (Glycine
SOIL MOISTURE TENSION		max (L.) Merr.),
Nitrate Reduction in Soils: Effect of Soil	SOLUTES	W74-01599 3F
Moisture Tension,	Transient Movement of Water and Solutes in	W /4-01399 3F
W74-01583 2G	Unsaturated Soil Systems,	SPAIN
11/4-01505	W74-01104 2G	
SOIL PHYSICAL PROPERTIES		Regional Water Resources Studies - A Spanish
Physical Properties of Some Volcanic-Ash	Lateral Diffusion Interferences in Flame	Experience,
Derived Soils of the Highlands of Pasto,	Atomic Absorption and Emission Spec-	W74-01622 4B
Narino, Colombia, (In Spanish),	trometry,	CD. 27.17 DIGERENIESON
W74-01228 2G	W74-01342 2K	SPATIAL DISTRIBUTION
		The Structure of an Acid Moorland Pond Com-
Effect of Puddling on Physical Properties of	SOLVENT EXTRACTIONS	munity,
Rice Soil,	Extraction-Photometric Determination of	W74-01508 5C
W74-01246 3F	Uranium (IV) with Chlorophosphonazo-III,	
	W74-01364 5A	SPECIATION
Physical Edaphology. The Physics of Irrigated	***	Sublittoral Benthic Marine Algae of Southern
and Nonirrigated Soils,	SOLVENTS	Cape Cod and Adjacent Islands: Pseu-
W74-01572 2G	Separation of Polyphosphates by Paper Chro-	dolithoderma Paradoxum Sp. Nov. (Ralf-
CON BROBERTIES	matography with a New Solvent,	siaceae, Ectocarpales),
SOIL PROPERTIES	W74-01366 5A	W74-01350 5A
Study of Soil Plasticity over a wide Range of	JA	
Soil Moisture Contents, W74-01636 2G	SONORA (MEXICO)	Computer Identification of Yeasts of the Genus
W74-01636 2G	Impact of Irrigation Investments on Regional	Saccharomyces,
SOIL SALINIZATION	and Urban Development.	W74-01646 5A
Soil Salinization Under Irrigated Cultivation,	W74-01625 6B	
W74-01238 3F		SPECIES DIVERSITY
W/4-01230	SORGHUM LEAVES	Stream Community Response to Nutrient En-
SOIL TREATMENT	Stomatal-Diffusion Resistance and Water	richment,
System of Treating Irrigated Soil which is	Potential of Soybean and Sorghum Leaves,	W74-01499 5C
Sown with Sugar Beets, (In Russian),	W74-01605 3F	
W74-01606 3F	117-01003	SPECTRAL ABSORPTION
	SORPTION	Spectral Absorption of Solar Radiation in Al-
SOIL TYPES	Fate of Lignin in Kraft Effluent Treatment,	pine Snowfields,
Soil Association Map of Knox County, Tennes-	W74-01320 5B	W74-01626 2C
sec.		-
W74-01146 7C	SOUTH AFRICA	SPECTRAL ANALYSIS
	A Waterborne Actinomycete Resembling	Thermal and Base-Catalyzed Hydrolysis
SOIL WATER	Strains Causing Mycetoma,	Products of the Systemic Fungicide, Benomyl,
Nitrates in Soil and Ground Water Beneath Ir-	W74-01256 5B	W74-01504 5B
rigated and Fertilized Crops,	W. 4-01230	36
W74-01245 3F	SOUTH AFRICA (KLIP RIVER)	SPECTROPHOTOMETRY
Study of Soil Plasticity over a wide Range of	The Ecology of the Diatoms of the Klip River,	Evaluation of Flame Emission Determination
Soil Moisture Contents,	Southern Transvaal,	of Phosphorus in Water,
W74-01636 2G	W74-01313 5C	W74-01116 5A
20		200

Versatile Computer Generated Variable Accelerating Voltage Circuit for Magnetically

STORMS

Shoreline Processes Near Barrow, Alaska: A Comparison of the Normal and the

SPECTROPHOTOMETRY

Lateral Diffusion Interferences in Flame STABLE ISOTOPES

Atomic Absorption and Emission Spectrometry,

W74-01342 2K	Scanned Mass Spectrometers. Use for Assays in the Picogram Range and for Assays of Stable	Catastrophic, W74-01193 2L
A Procedure for the Estimation of Microgram	Isotope Tracers,	W74-01193 2L
Quantities of Triton X-100,	W74-01335 2K	STRATIFICATION
W74-01360 5A	CTANOBUEN S	A Note on Edge Waves in a Stratified Fluid,
Extraction-Photometric Determination of	STANOPHEN 1 Biodegradation of O-Benzyl-P-Chlorophenol,	W74-01194 2E
Uranium (IV) with Chlorophosphonazo-III,	W74-01552 5B	Estuarine Circulation Induced by Diffusion,
W74-01364 5A		W74-01222 2L
Simplified Spectrophotometric Analysis of	STATIC INVERTER SYSTEMS	CTD ATIFIED PLOW
Plants for Selenium,	Choosing a Static Inverter System, W74-01547 7B	STRATIFIED FLOW Boundary Contractions as Controls in Two-
W74-01406 2K	174-01547	Layer Flows,
	STATISTICAL METHODS	W74-01276 8B
SPECTROSCOPY	Population Dynamics of Pond Zooplankton, I.	
Concentrations of Plutonium, Cobalt, and Silver Radionuclides in Selected Pacific	Diaptomus pallidus Herrick, W74-01502 5C	STRATIGRAPHY
Suver Radionucides in Selected Pacific Seaweeds,	W 74-01302 3C	Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River
W74-01297	STATISTICAL MODELS	Area, Georgia,
Thermal and Base-Catalyzed Hydrolysis	A Stochastic Model of Streamflow Based on	W74-01122 2J
Products of the Systemic Fungicide, Benomyl,	the Theory of Functions of Markov Processes,	
W74-01504 5B	W74-01123 2E	STRAWBERRY
SPIDER MITES	STATISTICS	Effect of Flooding on the Twospotted Spider
Effect of Flooding on the Twospotted Spider	A Profile of the Four Moment Measures Per-	Mite and its predators on Strawberry in Southern California,
Mite and its predators on Strawberry in	pendicular to a Shore Line, South Haven,	W74-01243 3F
Southern California,	Michigan,	31
W74-01243 3F	W74-01184 2H	STREAMFLOW
SPINACH	STATUTES	Single-Velocity Method in Measuring
The Effect of Substrate Humidity on the	Florida Pollution Statute Infringes Upon Exclu-	Discharge,
Supply of Macroelements to Plants, (In Latvi-	sive Federal Maritime Legislative Domain, The	W74-01161 2C
an),	American Waterways Operators, Inc. v.	Hydrologic Engineering Methods for Water
W74-01241 3F	Askew, 335 F. Supp. 1241 (M.D. Fla). W74-01460 5G	Resources Development. Volume 2. Hydrologic
	W/4-01400	Data Management,
SPIRODELA-OLIGORRHIZA	STOCHASTIC PROCESSES	W74-01642 2E
Some Influences of Aquatic Vegetation on the Species and Number of Culicidae (Diptera) in	A Stochastic Model of Streamflow Based on	STREAMFLOW FORECASTING
Small Pools of Water.	the Theory of Functions of Markov Processes, W74-01123 2E	A Stochastic Model of Streamflow Based on
W74-01609 2I	W/4-01123	the Theory of Functions of Markov Processes,
	A Hybrid Model for Irrigation Planning Using	W74-01123 2E
SPOIL DISPOSAL	Chance Constrained Programming and	STREPTOCOCCUS FAECALIS
Effect of Spoil Disposal on Benthic Inver- tebrates,	Hydrologic Simulation,	Litmus Milk Reaction as a Distinguishing Fea-
W74-01420 5C	W74-01488 4B	ture Between Streptococcus Faecalis of Human
	STOMATAL DIFFUSION RESISTANCE	and Non-Human Origins,
SPRING CREEK (PENN)	Stomatal-Diffusion Resistance and Water	W74-01549 5A
Stream Community Response to Nutrient En-	Potential of Soybean and Sorghum Leaves,	STROMS
richment, W74-01499 5C	W74-01605 3F	Coastal Processes and Beach Dynamics at
W74-01499 5C	STONEFLIES	Sheboygan, Wisconsin, July, 1972,
SPRINGS	Revisions and New Taxa in New Zealand	W74-01130 2H
Contribution to Physicochemical Study of	Notonemouridae (Insecta: Plecoptera),	
Some Springs of the Gapeau River Basin (Var),	W74-01299 2I	STRONTIUM
W74-01288 2K	Emergence, Reproduction, and Growth of	Sr-87/Sr-86 Ratios and Total Strontium Con- centrations in Surface Waters of the Scioto
ST. CROIX RIVER (MINN AND WIS)	Setipalpian Plecoptera in Southern Ontario,	River Drainage Basin, Ohio,
Designating a Segment of the St. Croix as Part	W74-01359 5A	W74-01516 5B
of Wild and Scenic Rivers System.	STONEWALL COUNTY (TEX)	
W74-01619 6E	Recognition of Natural Brine by Electrical	SUBMERGED PLANTS
ST. JOE RIVER (IDAHO)	Soundings Near the Salt Fork of the Brazos	Element Constitution of Selected Aquatic
Report of Attitudes and Opinions of Recrea-	River, Kent and Stonewall Counties, Texas,	Vascular Plants from Pennsylvania: Submersed and Floating Leaved Species and Rooted Emer-
tionists Towards Wild and Scenic Rivers: A	W74-01370 2F	gent Species,
Case Study of the St. Joe River,	STORAGE	W74-01526 5A
W74-01102 6B	Viability of Lyophilized Microorganisms after	
ST. JOHNS RIVER BASIN (FLA)	Storage,	SUBSTRATE UTILIZATION Studies on Methanol-Oxidizing Bacteria, I.
Availability of Fresh Water in the East Central	W74-01538 5C	Isolation and Growth Studies,
Florida Planning Region.	STORAGE VOLUME	W74-01535 5C
W74-01481 6D	On the Optimal Operation of Groundwater	
CT 1 AWDENCE BURD	Basins: A Calculus of Variations Approach,	SUBSURFACE DRAINAGE
ST. LAWRENCE RIVER Quality of Surface Waters of the United States,	W74-01489 4B	Murfee v. Phillips Petroleum Company (Action
1968: Parts 4 and 5. St Lawrence River Basin	STORM DRAINAGE	by Property Owners Against Oil and Gas Les- sees for Diminution of Market Value of Land
and Hudson Bay and Upper Mississippi River	Promoting Environmental Quality Through	Due to Pollution of Underground Fresh Water
Basins.	Urban Planning and Controls,	Supply).
W74-01268 2K	W74-01470 5D	W74-01459 6E

SUBSURFACE WATERS	SURF	SUSPENDED SOLIDS
Recognition of Natural Brine by Electrical	Long Surf,	A Simple Portable Field Nephelometer,
Soundings Near the Salt Fork of the Brazos River, Kent and Stonewall Counties, Texas,	W74-01203 2E	W74-01247 7B
W74-01370 2F	SURFACE-GROUNDWATER RELATIONSHIPS Chemical Relationships Between Surface	Techniques for Measuring Light Absorption Scattering, and Particle Concentrations in
SUCCESSION	Water and the Ground in South Florida,	Water,
Algal Succession on Artificial Reefs in a	W74-01153 2K	W74-01283 7E
Marine Lagoon Environment in Guam, W74-01429 5C	SURFACE WATER	A Modified Filtration Method for the Analysis
	Regional Water Resources Studies - A Spanish	of Wastewater Suspended Solids,
Kinetics of Silicon-Limited Growth in the	Experience,	W74-01318 5A
Marine Diatom Thalassiosira pseudonana Hasle and Heimdal (Equals Cyclotella Nana Hustedt),	W74-01622 4B	SWAMPS
W74-01431 5C	SURFACE WATER AVAILABILITY	Chemical Relationships Between Surface
	Surface-Water Resources of the USSR and	Water and the Ground in South Florida,
SUGAR BEET CROPS	Their Change Resulting from Human Economic	W74-01153 2K
Effects of Shading and of Seasonal Differences in Weathering on the Growth, Sugar Content	Activity (Resursy poverkhnostnykh vod SSSR i	SWEDEN
and Sugar Yield of Sugar Beet Crops,	ikh izmeneniye pod vliyaniyem khozyaystven- noy deyatel'nosti),	Swedish Lake Restoration Program Get
W74-01229 3F	W74-01133 4A	Results,
SUGAR BEET YIELD		W74-01262 50
Effect of an Increased Water Rate in Liquid	SURFACE WATERS	
Dressing on Sugar Beet Yield, (In Russian),	Surface-Water Resources of the USSR and Their Change Resulting from Human Economic	Bottom Fauna as an Indicator of Water Quality in Sweden's Large Lakes (Lakes Malaren, Vat
W74-01211 3F	Activity (Resursy poverkhnostnykh vod SSSR i	tern and Vanern).
SUGAR BEETS GROWTH	ikh izmeneniye pod vliyaniyem khozyaystven-	W74-01531 5E
System of Treating Irrigated Soil which is	noy deyatel'nosti),	
Sown with Sugar Beets, (In Russian),	W74-01133 4A	SWEET POTATO PROCESSING WASTES Wastewater Characterization of Sweet Potato
W74-01606 3F	Urbanization and Its Effects on Regimen and	Processing,
SULFATES	Quality of Surface Waters (Urbanizatsiya i	W74-01324 5A
A Systematic Study of the Variables Involved	yeye vliyaniye na rezhim i kachestvo poverkh-	
in the Reverse-Phase Thin-Layer Chromatog-	nostnykh vod), W74-01139 4C	SWITZERLAND (LA SERRIERE RIVER BASIN) Study of the Speed of Water Circulation in a
raphy of Oxyethylated Alkyl Sulfate Surfac-	***************************************	Water-Bearing Limestone Deposit by Tracing
tants, W74-01358 5A	The Circulation of Surface Waters in Raleigh	Tests (La Serriere River Basin/NE),
W74-01358 5A	Bay, North Carolina, W74-01210 2L	W74-01563 28
SULFIDES	W74-01210 2L	SWITZERLAND (LAKE NEUCHATEL)
Isotopic Composition of Oxygen and Hydrogen	Quality of Surface Waters of the United States,	Prediction of the Variation in the Chemistry of
in Sulfide Waters of the Sochi-Adler Artesian Basin (Izotopnyy sostav kisloroda i vodorada	1968: Parts 4 and 5. St Lawrence River Basin	a Lake Resulting from an Increase in Soluble
sul'fidnykh vod Sochi-Adlerskogo artezian-	and Hudson Bay and Upper Mississippi River Basins.	Deposits: Application: The Sodium in Lake
skogo basseyna),	W74-01268 2K	Neuchatel,
W74-01394 2K		W74-01562 2F
SULFOBROMOPHTHALEIN	Techniques for Measuring Light Absorption Scattering, and Particle Concentrations in	SYSTEMATICS
Metabolism and Biliary Excretion of Sul-	Water,	Revisions and New Taxa in New Zealand
fobromophthalein by Rainbow Trout (Salmo	W74-01283 7B	Notonemouridae (Insecta: Plecoptera),
Gairdneri),	Manuscia the Paulonanat A Clabel Barian	W74-01299 2
W74-01411 5C	Mercury in the EnvironmentA Global Review Including Recent Studies in the Delaware Bay	Revision of Family and Some Generic Defini
SULFUR COMPOUNDS	Region,	tions in the Phaennidae and Scolecithricidae
The Determination of Organo-Sulfur Com-	W74-01373 5B	(Copepoda: Calanoida),
pounds by Thin-Layer Chromatography Via a Ligand-Exchange Precess,	SURFACTANTS	W74-01308 5A
W74-01439 5A	A Systematic Study of the Variables Involved	A New Species of Boeckella (Copepoda: Cala
311	in the Reverse-Phase Thin-Layer Chromatog-	noida) from Northland, New Zealand,
Study of Chelated Mixtures of Ferric Ions with	raphy of Oxyethylated Alkyl Sulfate Surfac-	W74-01309 5A
Nitrilotriacetic, Sulfo-5-Salicylic and Pyrocatechol-3,5-Disulfonic Acids, (In French),	tants,	New Records of Sargassum Hawaiiensis Doty
W74-01440 5A	W74-01358 5A	and Newhouse (Sargassaceae, Phaeophyta),
	SURGES	Deep Water Species,
SULFUR CYCLE The Effect of Microbial Activity Upon the	Oscillations of Tide and Surge in an Estuary of	W74-01349 2
The Effect of Microbial Activity Upon the Sedimentary Sulphur Cycle,	Finite Length, W74-01649 2L	Benthic Macroinvertebrates as Indexes o
W74-01239 5B	11.4-01042 ZL	Water Quality in Whetstone Creek, Morrov
	SURVEYS	County, Ohio (Scioto River Basin),
SUNFLOWER Water Regime of Sunflower Under Different	Agriculture, Forestry, Range Resources,	W74-01517 51
Conditions of Phosphorus Nutrition, (In Rus-	W74-01164 3F	SYSTEMS ANALYSIS
sian),	SURVIVAL	Physical System Modelling as a Tool in Wate
W74-01227 3F	Viability of Lyophilized Microorganisms after	Resource Planning,
SUPERSATURATION	Storage,	W74-01487 2/
JUL DINGLE VARIETY	W74-01538 5C	

Relationships of Indicator and Pathogenic Bac-

teria in Stream Waters, W74-01645

Passage Through Hydroelectric Turbines at Mactaquac Dam,
W74-01432

Supersadium 1 National Material Supersadium 1 National Material Materi

TANNER BASIN (CALIF)
C 18-Isoprenoid Ketone in Recent Marine Sedi-

ment, W74-01301

5B

TARBUSH

TARBUSH	Germination Responses of a Texas Population	THERMOPHILIC ANIMALS
Brush Eradicating, Basin Pitting, and Seeding	of Ocotillo (Fouquieria splendens Engelm.) To	Distribution Patterns and Population Dyanmics
Machine for Arid to Semiarid Rangeland,	Constant Temperature, Water Stress, pH and	of the Micro-Arthropods of a Desert Soil in
W74-01637 4A	Salinity, W74-01591 2I	Southern California, W74-01635 2I
TEMPERATURE SELECTION	W 74-01391 21	1174-01055
Temperature Selection by Juvenile and Adult	The Management of Bay and Estuarine	THIN LAYER CHROMATOGRAPHY
Yellow Perch (Perca Flavescens) Acclimated to	Systems in the Texas Coastal Zone, Phase II.	A Systematic Study of the Variables Involved
24 C,	W74-01620 5G	in the Reverse-Phase Thin-Layer Chromatog-
W74-01353 5A	** 1 1 C 1 M M . * 1	raphy of Oxyethylated Alkyl Sulfate Surfac-
TENNESSEE	Underground Storage of Texas Playa Lake	tants, W74-01358 5A
Overburden Related to Type of Bedrock and	Waters by Injection Into the Ogallala Forma- tion Under Moderate Pump Pressure,	W74-01358 5A
Engineering Characteristics of the Bedrock,	W74-01627 4B	TIDAL CYCLE
Knox County, Tennessee,	45	Littoral Zone Tidal-Cycle Sedimentation,
W74-01144 7C	Effects of Leaf-Footed Bugs on Mesquite	W74-01192 2J
Cotonosion of Robotics Possibility for Contin	Reproduction,	TIDAY GUAYA
Categories of Relative Feasibility for Septic- Tank Filter Fields in Knox County, Tennessee,	W74-01638 4A	TIDAL CYCLES
W74-01145 7C	TPVAC (BARTI PTT)	Tidal Cycle of Changes in an Equilibrium Beach, Sandy Hook, New Jersey,
W/401145	TEXAS (BARTLETT) Effect of Partial Defluoridation of a Water	W74-01198 2L
Soil Association Map of Knox County, Tennes-	Supply on Dental Fluorosis: Final Results in	
see.	Bartlett, Texas, After 17 Years,	TIDAL EFFECTS
W74-01146 7C	W74-01578 5F	Sediment Transport in a Coastal Plain Estuary,
Ground Water Vield Petential in Very County		W74-01185 2L
Ground-Water Yield Potential in Knox County, Tennessee.	TEXTILE INDUSTRY	A Charles of Widel Disserting in the Dates
W74-01147 7C	The Impact of Water Pollution Abatement on	A Study of Tidal Dispersion in the Potomac
W/4-0114/	Competition and Pricing in the Alabama Textile	River, W74-01196 5B
Areas of Possible Flooding in Knox County,	Industry,	W/4-01190
Tennessee,	W74-01101 5G	On the Vertical Structure of Tidal Flow in
W74-01269 7C	THALLIUM	River Estuaries,
Areas with Abundant Sinkhalas in Kasa Gaus	The Determination of Thallium in Urine and	W74-01205 2L
Areas with Abundant Sinkholes in Knox Coun- ty, Tennessee,	Plasma by Delves Cup Atomic Absorption,	
W74-01270 7C	W74-01314 5A	Erosion of Tidal Flats Near Georgetown,
70	JA	British Guiana, W74-01216 2J
TENNESSEE (KENTUCKY LAKE)	THENOYLTRIFLUOROACETONE	W/4-01210
Freshwater Mussel Ecology, Kentucky Lake,	Distribution Studies of Radium and Other	Some Consequences of an Inertia of Turbu-
Tennessee, May 1, 1969-June 15, 1972,	Metallic Elements Between Thenoyl-	lence in a Tidal Estuary,
W74-01641 5C	trifluoroacetone in Methyl Isobutyl Ketone and	W74-01648 2L
TENNESSEE RIVER	Aqueous Solutions,	0 71 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Freshwater Mussel Ecology, Kentucky Lake,	W74-01494 5A	Oscillations of Tide and Surge in an Estuary of
Tennessee, May 1, 1969-June 15, 1972,	THERMAL DIPPLICION POLIATION	Finite Length, W74-01649 2L
W74-01641 SC	THERMAL DIFFUSION EQUATION Thermal Stratification in Industrial Canals,	W/4-01049 2L
	W74-01594 2E	TIDAL FLATS
TENNESSES	W/4-01354	Erosion of Tidal Flats Near Georgetown,
Engineering Characteristics of Overburden in	THERMAL POLLUTION	British Guiana,
Knox County, Tennessee,	Field and Experimental Studies on the Effects	W74-01216 2J
W74-01143 7C	of a Power Station Effluent on Tubificidae	TIDAL WATERS
TERRITORIAL WATERS	(Oligochaeta, Annelida),	Tidewater Shorelines in Broward and Palm
Marine Pollution: A Critique of Present and	W74-01312 5C	Beach Counties, Florida: An Analysis of
Proposed International Agreements and Institu-		Characteristics and Changes Interpreted from
tionsA Suggested Global Oceans' Environ-	Thermophilic Ostracod: Aquatic Metazoan with	Color, Color Infrared and Thermal Aerial
mental Regime,	the Highest Known Temperature Tolerance,	Imagery,
W74-01449 5G	W74-01327 5C	W74-01220 2L
	Dieldrin. Effects of Chronic Sublethal Expo-	
TETRANYCHUS-URTICAE	sure on Adaptation to Thermal Stress in Fresh-	TIDES
Effect of Flooding on the Twospotted Spider Mite and its predators on Strawberry in	water Fish,	Investigations on the Influence of Tides on Salinity, Content of Suspended Matter, Sedi-
Southern California,	W74-01408 5C	mentation and Bacteria Counts in the Elbe
W74-01243 3F		Estuary, (Untersuchungen Uber Die Einwir-
	THERMAL SPRINGS	kung Der Tide Auf Salzgehalt, Schwebstoff-
TEXAS	Isotopic Composition of Helium in Thermal	gehalt, Sedimentation Und Bakteriengehalt in
Recreational Reuse of Municipal Wastewater,	Springs of Iceland (Izotopnyy sostav geliya ter- mal'nykh istochnikov Islandii),	Der unterelbe),
W74-01103 5D	W74-01396 2K	W74-01175 2L
Recognition of Natural Brine by Electrical	an an	On Standard Patrol-
Soundings Near the Salt Fork of the Brazos	THERMAL STRATIFICATION	On Structure, Entrainment, and Transport in
River, Kent and Stonewall Counties, Texas,	Thermal Stratification in Industrial Canals,	Estuarine Embayments, W74-01178 2L
W74-01370 2F	W74-01594 2E	2L
	THERMODYNAMICS	Tidal Period Oscillations of an Isohaline Sur-
Murfee v. Phillips Petroleum Company (Action	THERMODYNAMICS	face Off the Mouth of the Columbia River,
by Property Owners Against Oil and Gas Les-	Thermodynamics of Acid-Base Equilibria. II.	W74-01188 2L
sees for Diminution of Market Value of Land Due to Pollution of Underground Fresh Water	Ionization of m- and p-Hydrox- ybenzotrifluoride and the Concept of Fluorine	Oscillations of Tide and Surge in an Estuary of
Supply).	Double Bond-No Bond Resonance.	Finite Length,
W74-01459 6E	W74-01226 2K	W74-01649 2L
-		

TISSUE	Scanned Mass Spectrometers. Use for Assays	TREES
Fluorometric Quantitation of Gallium in Biolog-	in the Picogram Range and for Assays of Stable	Hydrologic Nutrient Cycle Interactions in
ical Materials at Nanogram Levels,	Isotope Tracers,	Undisturbed and Manipulated Ecosystems
W74-01344 2K	W74-01335 2K	(Watersheds),
		W74-01110 4C
TOBACCO	Precolumn Inlet System for the Gas Chromato-	
Determination of Meleic Hydrazide Residues in	graphic Analysis of Trace Quantities of Short-	TRIAZINE PESTICIDES
Tobacco and Vegetables,	Chain Aliphatic Amines,	Microdetermination of Chloro-S-Triazines in
W74-01418 5A	W74-01357 5A	Soil by Gas-Liquid Chromatography with
		Nickel Electron Capture or Electrolytic Con-
TOLEDO HARBOR (OHIO)	A Procedure for the Estimation of Microgram	ductivity Detection,
Currents at Toledo Harbor,	Quantities of Triton X-100,	W74-01304 5A
W74-01214 2H	W74-01360 5A	W 74-01304 3A
W/4-01214	W/4-01300	TRICHOPTERA
TOPOGRAPHY	TRACERS	Factors Affecting the Distribution of Some
Beach Changes on the Outer Banks of North	Sr-87/Sr-86 Ratios and Total Strontium Con-	
Carolina,		Phryganeaeid (Trichoptera) in Malham Tarn,
W74-01179 2E	centrations in Surface Waters of the Scioto	Yorkshire,
W/4-011/9	River Drainage Basin, Ohio,	W74-01586 21
A Profile of the Four Moment Measures Per-	W74-01516 5B	TRANSPORT PUPI
pendicular to a Shore Line, South Haven,	TRACES TRACES	TROPHIC LEVEL
Michigan,	TRACING TESTS	Bottom Fauna as an Indicator of Water Quality
	Study of the Speed of Water Circulation in a	in Sweden's Large Lakes (Lakes Malaren, Vat-
W74-01184 2H	Water-Bearing Limestone Deposit by Tracing	tern and Vanern),
Note on the Fountiers of Lone Wayes Over on	Tests (La Serriere River Basin/NE),	W74-01531 5B
Note on the Equations of Long Waves Over an	W74-01563 2F	
Uneven Bottom,		TROUT (DISEASED)
W74-01189 2E	TRAINING	A Diseased Trout: Microbiological Study of Its
MONTORY	Graduate Courses Related to Water Resources.	Principal Organs and Its Environment,
TOXICITY	W74-01119 9A	W74-01267 5C
Evaluation of the Response of Dugesia Tigrina	W/T-UIII) 9A	
to Aflatoxin B1,	Educational Programs for Land and Water	TSUGA-MERTENSIANA
W74-01404 5C		The Vegetation of Findley Lake Basin,
	Resources Development and Management,	W74-01587 5C
The Sensitivity of Suppressed and Unsup-	W74-01628 6B	W/4-0136/
pressed Lon Strains of Escherichia coli to		TUBIFICIDS
Chemical Agents with Induce Filamentation,	TRANSLATIONS	Field and Experimental Studies on the Effects
W74-01524 5C	Literature on Mercury: Availability of English	
	Translations,	of a Power Station Effluent on Tubificidae
Growth Rates of Sediment-Living Marine	W74-01323 5A	(Oligochaeta, Annelida),
Protozoan as a Toxicity Indicator for Heavy		W74-01312 5C
Metals.	TRANSPIRATION	
W74-01529 5A	Leaf Temperatures, Diffusion Resistances, and	TUCSON (ARIZ)
	Transpiration,	A Cost-Effectiveness Study and Analysis of
TOXICOLOGICAL STUDIES	W74-01254 2D	Municipal Refuse Disposal Systems,
Epidemiological and Toxicological Aspects of	W/4-01254 2D	W74-01631 5E
Nitrates and Nitrites in the Environment,	A New Type of Climatized Gas Exchange	
W74-01386 5C	Chamber for Net Photosynthesis and Trans-	TUNDRA LAKES
W/4-01360 3C		Seasonal Variation of Chemical Parameters in
TRACE ELEMENTS	piration Measurements in the Field,	Alaskan Tundra Lakes,
Evaluation of the Use of the Heated Graphite	W74-01568 2I	W74-01347 5E
	Diversi Chance in Transferring and Daily	-
Atomizer for the Routine Determination of	Diurnal Changes in Transpiration and Daily	TURBIDITY
Trace Metals in Water,	Photosynthetic Rater of Several Crop Plants,	Relationships Between Turbidity and Hydro
W74-01316 5A	W74-01597 2D	graphical Factors in Fresh and Brackish Water
A Comparison of Fast Destruction Methods for	Stomatal-Diffusion Resistance and Water	Region of the Elbe Estuary, (In German),
the Determination of Trace Metals in Biological	Potential of Soybean and Sorghum Leaves,	W74-01260 5E
Materials,	W74-01605 3F	TURBULENCE
W74-01317 5A		
	TRANSPIRATION CONTROL	Some Consequences of an Inertia of Turbu-
Pathways of Trace Elements in Arctic Lake	Potential Usefulness of Antitranspirants for	lence in a Tidal Estuary,
Ecosystems,	Solution of Some Water Supply, Plant Growth,	W74-01648 2L
W74-01401 5B	and Environmental Problems,	MILE PARTY NAME & COLUMN / TOTAL COL
	W74-01105 3B	TURBULENT BOUNDARY LAYERS
An Automated Method for the Dertemination	W/4-01103	Flow Visualization in Free Shear Layers,
of Trace Amounts of Metal Ions by Ion-	TRANSPORT	W74-01271 8E
Exchange Chromatography. Determination of	Mechanism of NTA Degradation By a Bacterial	
zinc (II) in Waters,		Turbulent Fluid Friction of Rotating Disks,
W74-01438 5A	Mutant,	W74-01640 80
	W74-01515 5B	
Concentrations of Some Trace Metals in	MAD A MANUAL DA CHE IMPER	TURBULENT FLOW
Pelagic Organisms and of Mercury in Northeast	TREATMENT FACILITIES	Flow Visualization in Free Shear Layers,
Atlantic Ocean Water.	1968 Inventory of Municipal Waste Facilities,	W74-01271 8E
W74-01523 5C	A Cooperative State Report: Region 5, Illinois,	
30	Indiana, Michigan, Minnesota, Ohio, Wiscon-	TWO-PHASE SAMPLING
Emission Spectrometric Determination of	sin.	Estimation of Domain Means Using Two-Phase
Trace Metals in Biological Tissues,	W74-01282 5D	Sampling.
W74-01546 5A	-	W74-01498 71
JA	TREATMENT FACILTIES	71
TRACE LEVELS	Utility Provisions Analysis for East Central	ULTRASONIC THERMOMETRY
Versatile Computer Generated Variable Ac-	Florida.	Ultrasonic Thermometry,
celerating Voltage Circuit for Magnetically	W74-01480 6D	W74-01501 71

A Linear Programming Approach to Floodplain

Urbanization and Its Effects on Regimen and

Quality of Surface Waters (Urbanizatsiya i

21

USSR (KANEVSKII NATIONAL RESERVE) Spring Flooding and Fauna (In Russian), W74-01261

URBAN AREAS

UNITED KINGDOM (MALHAM

TARN-YORKSHIRE)

Factors Affecting the Distribution of Some	Land Use Planning in Urban Areas,	yeye vliyaniye na rezhim i kachestvo poverkh-
Phryganeaeid (Trichoptera) in Malham Tarn,	W74-01490 3D	nostnykh vod),
Yorkshire,		W74-01139 4C
W74-01586 2I	URBAN GUIDANCE SYSTEMS	
	Promoting Environmental Quality Through	Division of the United States into Regions Ac-
UNITED KINGDOM (PEN-FFORDD-GOCH	Urban Planning and Controls,	cording to Cophasal Fluctuations of Annual
POND) The Structure of an Apid Moorland Bond Com	W74-01470 5D	Runoff (Rayonirovaniye territorii SShA po sin-
The Structure of an Acid Moorland Pond Com-	URBAN HYDROLOGY	faznosti kolebaniy godovogo stoka rek),
munity, W74-01508 5C	Urbanization and Its Effects on Regimen and	W74-01140 2E
W/4-01300	Quality of Surface Waters (Urbanizatsiya i	Problems in Regional Dynamics of Artesian
UNITED KINGDOM (RIVER TRENT)	yeye vliyaniye na rezhim i kachestvo poverkh-	Water (Problemy regional'noy dinamiki artezi-
Field and Experimental Studies on the Effects	nostnykh vod),	anskikh vod),
of a Power Station Effluent on Tubificidae	W74-01139 4C	W74-01141 2F
(Oligochaeta, Annelida),		
W74-01312 5C	Engineer's Report for South Valley Water	Prospects for the Use and Conservation of
UNITED STATES	System.	Water Resources in the USSR (Perspektivy
Division of the United States into Regions Ac-	W74-01382 6B	ispol'zovaniya i okhrany vodnykh resursov
cording to Cophasal Fluctuations of Annual	URBAN RUNOFF	SSSR), W74-01387 6B
Runoff (Rayonirovaniye territorii SShA po sin-	Leaves as Source of Phosphorus,	W 74-01367
faznosti kolebaniy godovogo stoka rek),	W74-01407 5B	Quaternary Shorelines of the Seas of Okhotsk
W74-01140 2E	W/4-0140/	and Japan (Chetvertichnyye beregovyye linii
	URBAN SOCIOLOGY	Okhotskogo i Yaponskogo morey),
International Field Year for the Great Lakes.	Urbanization and Its Effects on Regimen and	W74-01391 2J
W74-01162 2H	Quality of Surface Waters (Urbanizatsiya i	Commence of the Commence of th
A DIR A PARIS AS COMMENTAL	yeye vliyaniye na rezhim i kachestvo poverkh-	USSR (AGAPA RIVER)
A Bill to Establish the Canaveral National	nostnykh vod),	Invertebrate Fauna of Waters of the Station
Seashore in the State of Florida. W74-01457 6E	W74-01139 4C	'Agapa' (Western Taimyr), (In Russian),
W74-01457 6E		W74-01264 2I
A Bill to Establish in the State of California the	URBANIZATION	USSR (ANTARTICA)
Santa Monica Mountain and Seashore National	Urbanization and Its Effects on Regimen and	Use of Isotopic Methods to Determine Present
Urban Park.	Quality of Surface Waters (Urbanizatsiya i	Rates of Snow Accumulation in Antarctica
W74-01458 6E	yeye vliyaniye na rezhim i kachestvo poverkh-	(Ispol'zovaniye izotopnykh metodov dlya
	nostnykh vod),	opredeleniya sovremennoy skorsti nakopleniya
A Bill to be Known as the 'River Basin Waste	W74-01139 4C	snega v Antarktide),
Treatment Authority Act of 1973'.	Engineer's Report for South Valley Water	W74-01393 2C
W74-01614 6E	System.	
Federal Water Pollution Control Act Amend-	W74-01382 6B	USSR (AZERBAIDZHAN)
ments of 1972.		System of Treating Irrigated Soil which is
W74-01615 5G	Promoting Environmental Quality Through	Sown with Sugar Beets, (In Russian),
	Urban Planning and Controls,	W74-01606 3F
A Bill Authorizing the State of Illinois and the	W74-01470 5D	USSR (AZOV SEA)
Metropolitan Sanitary District of Greater	Floodland and Shoreland Development Guide.	Zoobenthos of the Azov Sea After the Control
Chicago to Increase the Diversion of Water	W74-01483 4A	of THE Don River, (In Russian),
from Lake Michigan into the Illinois Waterway. W74-01618	41	W74-01257 2L
W74-01618 6E	Impact of Irrigation Investments on Regional	
UNIVERSITIES	and Urban Development,	USSR (CAUCASUS MOUNTAINS)
Graduate Courses Related to Water Resources.	W74-01625 6B	Balance Estimate of Groundwater Resources
W74-01119 9A		on the Northwestern Slope of the Caucasus
	URINE	(Balansovaya otsenka resursov podzemnykh
Educational Programs for Land and Water	The Determination of Thallium in Urine and	vod severo-zapadnogo sklona Bol'shogo Kav-
Resources Development and Management,	Plasma by Delves Cup Atomic Absorption, W74-01314 5A	kaza),
W74-01628 6B	W74-01314 5A	W74-01136 4B
UNSATURATED SOIL	Metabolic Effects of Drinking Brackish Water,	USSR (CRIMEA)
Transient Movement of Water and Solutes in	W74-01632 5C	Two Harvest of Cereal Crops per Year with Ir-
Unsaturated Soil Systems,		rigation, (In Russian),
W74-01104 2G	USSR	W74-01202 3F
	Problems in Hydrology of Glaciers and	
UNSTEADY FLOW	Glacierized Areas (Problemy gidrologii led-	USSR (DESNA RIVER)
Reservoir Mechanism in an Aquifer of Arbitra-	nikov i lednikovykh rayonov),	Effect of the Desna River Flood on Develop-
ry Boundary Shape,	W74-01132 2C	ment of Vegetation and Flora of the Oster Out-
W74-01129 2F	Surface-Water Resources of the USSR and	skirts (Ukranian)
UPPER MISSISSIPPI RIVER BASIN	Their Change Resulting from Human Economic	W74-01362 2I
Quality of Surface Waters of the United States,	Activity (Resursy poverkhnostnykh vod SSSR i	USSR (KALMYK ASSR)
1968: Parts 4 and 5. St Lawrence River Basin	ikh izmeneniye pod vliyaniyem khozyaystven-	Regional Estimate of Brackish- and Saline-
and Hudson Bay and Upper Mississippi River	noy deyatel'nosti),	Groundwater Yield (Regional'naya otsenka
Basins.	W74-01133 4A	ekspluatatsionnykh resursov solonovatykh i
W74-01268 2K		solenykh podzemnykh vod),
	International Scientific and Technical Coopera-	W74-01137 4B

tion in the Field of Water Problems (Mezhdu-

narodnoye nauchno-tekhnicheskoye sotrud-nichestvo v oblasti vodnykh problem),

6E

W74-01138

URANIUM

W74-01364

Extraction-Photometric Determination

Uranium (IV) with Chlorophosphonazo-III,

USSR (KIEV HYDROELECTRIC STATION)	UTILITY EXTENSION	VIRUSES
Peat Floating in the Reservoir of the Kiev	Functional Water and Sewerage Plan and Pro-	Virus Concentration from Sewage,
Hydroelectric Station and its Role in Water	gram.	W74-01533 5D
Contamination, (in Russian),	W74-01469 5D	
W74-01352 5B	VAPOR PHASE INFRARED SPECTROMETRY	VISUAL CULTURAL VALUES Valuation of Visual-Cultural Benefits from
USSR (KOLYMA BASIN)	Simple Direct Combination of Gas Chromatog-	Freshwater Wetlands in Massachusetts,
Oxbow Cut-Off Bog Lake Zooplankton of the	raphy and Vapor Phase Infrared Spectrometry,	W74-01643 6B
Kolyma Basin (In Russian),	W74-01355 5A	VOLATILE ACIDS
W74-01265 2H	VARIABILITY	Improved Distillation Method for Volatile
TICON (VOLVIA) INDICIDUA I AVEC	Surface-Water Resources of the USSR and	Acids Analysis,
USSR (KOLYMA-INDIGIRKA LAKES)	Their Change Resulting from Human Economic	W74-01322 5A
Zooplankton in Kolyma-Indigirka Lakes (In	Activity (Resursy poverkhnostnykh vod SSSR i	
Russian), W74-01341 2H	ikh izmeneniye pod vliyaniyem khozyaystven-	VOLCANIC ASH
W/4-01341 2H	noy devatel'nosti),	Physical Properties of Some Volcanic-Ash
USSR (KRASNODAR TERRITORY)	W74-01133 4A	Derived Soils of the Highlands of Pasto, Narino, Colombia, (In Spanish),
Isotopic Composition of Oxygen and Hydrogen		W74-01228 2G
in Sulfide Waters of the Sochi-Adler Artesian	VEGETABLE CROPS	W 74-01228 20
Basin (Izotopnyy sostav kisloroda i vodorada	Determination of Meleic Hydrazide Residues in	VOLTAMMETRY (DIFFERENTIAL PULSE
sul'fidnykh vod Sochi-Adlerskogo artezian-	Tobacco and Vegetables,	STRIPPING)
skogo basseyna),	W74-01418 5A	Analytical Applications of Pulsed Voltammetric
W74-01394 2K	VEGETATION	Stripping at Thin Film Mercury Electrodes,
	Effect of the Desna River Flood on Develop-	W74-01514 5A
Increase of Resistance of Carp to Dropsy by		
Means of Breeding. II. Course of Selection and	ment of Vegetation and Flora of the Oster Out- skirts (Ukranian)	VOLUMETRIC ANALYSIS
Evaluation of the Breed Groups, (In Russian),	W74-01362 2I	Chemical Constants of Metal Complexes from
W74-01560 5C	11/4-01302	a Complexometric Titration Followed with
TICCH /I OWER DATERED OF MICO	Profile of the Vegetation of the Elburs Moun-	Anodic Stripping Voltammetry, W74-01332 5A
USSR (LOWER DNIEPER SANDS)	tain Range (Northern Iran), (In German),	W/4-01332
Experimental Establishment of Forest Planta-	W74-01385 2I	Indirect Coulometric Titration of Biological
tions on Sands, in Accordance with the Idea of G. N. Vysotskii (In Russian),		Electron Transport Components,
W74-01569 2I	Bryocenological Research in Some Areas of the	W74-01338 2K
W 74-01305 21	Iron Gate of the Danube, (In Rumanian),	P. L. C. and A. L. C. and District
USSR (MALYY AZAU GLACIER)	W74-01453 2I	Evaluation of the Accuracy of Gran Plots by Means of Computer Calculations. Application
Geophysical Measurements of the Thickness of	VELOCITY	
the Malyy Azau Glacier (Geofizicheskiye	Longshore Current Velocity: A Review of	to the Potentiometric Titration of the Total Al- kalinity and Carbonate Content in Sea Water,
opredeleniya moshchnosti lednika Malyy	Theory and Data,	W74-01365 2K
Azau),	W74-01187 2E	W 74-01303
W74-01390 2C		The Potentiometric Titration of Potassium in
	VENTURA COUNTY (CALIF)	Sea Water with a Valinomycin Electrode,
USSR (MOSCOW RIVER)	Oxnard Basin Experimental Extraction-Type	W74-01442 5A
State of Rare Earth Elements in Surface	Barrier,	VORTEX OIL AND WATER SEPARATOR
Waters (O sostoyanii redkozemel'nykh elemen-	W74-01289 8B	Vortex Concept for Separating Oil from Water,
tov v poverkhnostnykh vodakh),	VIABILITY	W74-01148 50
W74-01395 2K	Acridine Orange-Epifluorescence Technique	117-011-10
USSR (SOCHI-ADLER ARTESIAN BASIN)	for Counting Bacteria in Natural Waters,	VORTICES
Isotopic Composition of Oxygen and Hydrogen	W74-01534 5A	Flow Visualization in Free Shear Layers,
in Sulfide Waters of the Sochi-Adler Artesian	W/4-01334	W74-01271 8E
Basin (Izotopnyy sostav kisloroda i vodorada	VIBRIO PARAHAEMOLYTICUS	WASHINGTON (BUILDING BOTTA BUILDING
sul'fidnykh vod Sochi-Adlerskogo artezian-	Microbial Flora and Level of Vibrio	WASHINGTON (DUWAMISH ESTUARY)
skogo basseyna),	Parahaemolyticus of Oysters (Crassostrea Vir-	The Relations of Periphytic and Planktonic
W74-01394 2K	ginica), Water and Sediment from Galveston	Algal Growth in an Estuary to Hydrographic Factors,
	Bay,	W74-01571 50
USSR (URAL INDUSTRIAL AREA)	W74-01548 5C	
Water Resources of the Ural Area and Basic	VIRGINIA	WASHINGTON (FINDLEY LAKE) *VASCULAR
Problems in Their Complex Use (Vodnyye re-	Sediment Transport in a Coastal Plain Estuary,	PLANTS
sursy Urala i osnovnyye problemy ikh kom-	W74-01185 2L	The Vegetation of Findley Lake Basin,
pleksnogo ispol'zovaniya),	W/4-01165 2L	W74-01587 50
W74-01135 3E	Two New Chytrids from the Appalachian	WASTE DISPOSAL
2180 A 22	Highlands,	Improved Waste Disposal Unit,
UTAH	W74-01305 5A	W74-01284 5I
Seasonal Water Potential Patterns in the Moun-		
tain Brush Zone, Utah, W74-01588 2I	Virginia Natural Resources Law and the New	A Cost-Effectiveness Study and Analysis o
W /4-01300 21	Virginia Wetlands Act,	Municipal Refuse Disposal Systems,
UTAH (RED BUTTE CANYON)	W74-01448 2L	W74-01631 51
Carbon Dioxide Exchange by Several Stream-	A Bill to Aid the Conservation of Natural	WASTE IDENTIFICATION
Side and Scrub Oak Community Species of Red	Water Resources.	Characterization and Treatability of Pomac
Butte Canyon, Utah,	W74-01616 6E	Stillage,
W74-01590 2I	OE	W74-01325 5/
	VIRGINIA (ROANOKE RIVER TRIBUTARY)	
UTILITIES	Longitudinal Distribution and Habitat of the	WASTE TREATMENT
Utility Provisions Analysis for East Central	Fishes of Mason Creek, an Upper Roanoke	A Bill to be Known as the 'River Basin Wast
Florida.	River Drainage Tributary, Virginia,	Treatment Authority Act of 1973'.
W74-01480 6D	W74-01592 2I	W74-01614 61

6E

WASTE WATER DISPOSAL

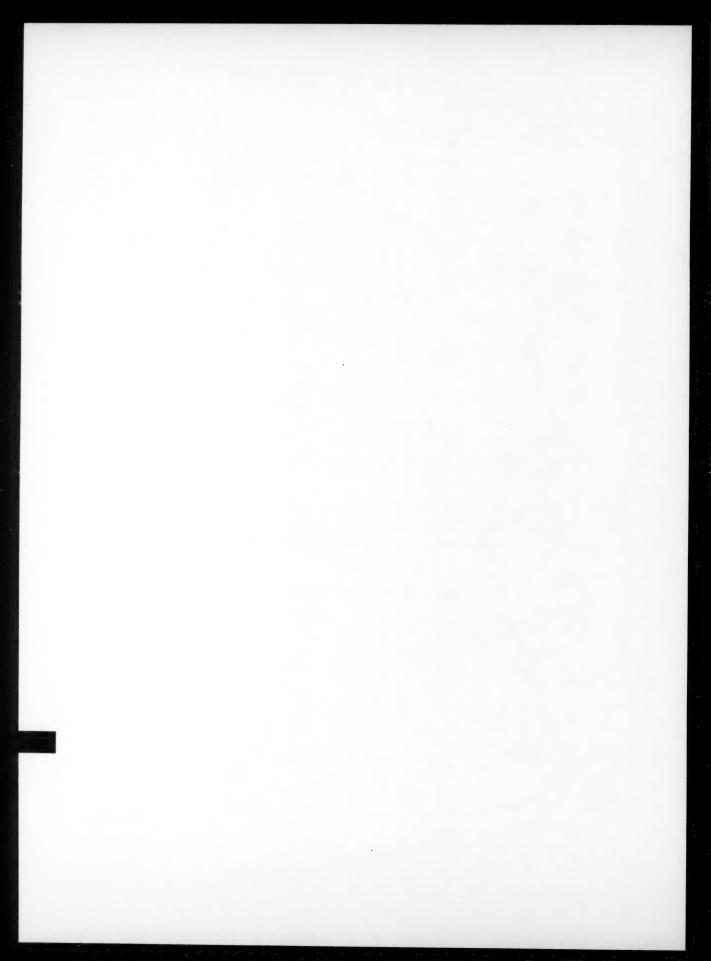
WASTE WATER DISPOSAL Recreational Reuse of Municipal Wastewater, W74-01103 5D	The Importance of Chelating Agents in Natural Waters and Wastewaters, W74-01326 5B	Seasonal Variation of Chemical Parameters in Alaskan Tundra Lakes, W74-01347 5B
WASTE WATER (POLLUTION) A Modified Filtration Method for the Analysis	Chemical Constants of Metal Complexes from a Complexometric Titration Followed with	WATER CIRCULATION The Transverse Circulation Near a Coast,
of Wastewater Suspended Solids, W74-01318 5A	Anodic Stripping Voltammetry, W74-01332 5A	W74-01206 2E
Heavy Metals in Wastewater and Treatment Plant Effluents,	Investigation of Spectral Overlap of the Neon 359.352-nm and Chromium 359.349-nm Spectral	Estuarine Circulation Induced by Diffusion, W74-01222 2L
W74-01319 5A	Lines in Atomic Absorption and Atomic	WATER CONSERVATION
A Bill to be Known as the 'River Basin Waste Treatment Authority Act of 1973'.	Fluorescence Spectrometry of Chromium, W74-01337 2K	Prospects for the Use and Conservation of Water Resources in the USSR (Perspektivy ispol'zovaniya i okhrany vodnykh resursov
W74-01614 6E	Fluorometric Determination of Selenium in Water with 2,3-Diaminonaphthalene,	SSSR),
WASTE WATER TREATMENT Water Quality Evaluation of Regionalized	W74-01399 5A	W74-01387 6B A Bill to Provide for the Establishment of the
Wastewater Systems, W74-01107 5D	An Automated Method for the Dertemination of Trace Amounts of Metal Ions by Ion-	Guana River National Park in the State of
Evaluation of the Bio-Disc Treatment Process	Exchange Chromatography. Determination of	Florida. W74-01617 6E
for Summer Camp Application,	zinc (II) in Waters, W74-01438 5A	
W74-01118 5D		Soil and Water Conservation on Arable Lands, W74-01633 3F
Removal of Phosphate and Secondary B.O.D. from Tertiary treated Wastewater by Aquatic	The Determination of Cadmium by Atomic Ab- sorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer,	WATER DEMAND
Animals, W74-01124 5D	W74-01441 5A	Agricultural Water Demand in North Carolina: Phases I and II,
Study of Water Recovery and Solid Waste	The Potentiometric Titration of Potassium in Sea Water with a Valinomycin Electrode,	W74-01112 6D
Processing for Aerospace and Domestic Appli- cations: Volume 1 - Final Report Summary,	W74-01442 5A	Availability of Fresh Water in the East Central Florida Planning Region.
W74-01280 5D	Sr-87/Sr-86 Ratios and Total Strontium Con-	W74-01481 6D
1968 Inventory of Municipal Waste Facilities, A Cooperative State Report: Region 5, Illinois, Indiana, Michigan, Minnesota, Ohio, Wiscon-	centrations in Surface Waters of the Scioto River Drainage Basin, Ohio, W74-01516 5B	WATER DISTRIBUTION (APPLIED) Tri-Agencies Pipeline: Engineering Report. W74-01477 8A
sin. W74-01282 5D	Nitrogen/Argon Ratios by Difference Thermal	
Improved Waste Disposal Unit,	Conductivity, W74-01522 5A	WATER DIVERSION A Bill Authorizing the State of Illinois and the
W74-01284 5D	WATER BALANCE A Deterministic Parametric Water-Balance	Metropolitan Sanitary District of Greater Chicago to Increase the Diversion of Water
Pressurized Sewer Collection Systems, W74-01286 5D	Model, W74-01126 2A	from Lake Michigan into the Illinois Waterway. W74-01618 6E
Characterization and Treatability of Pomace	Balance Estimate of Groundwater Resources	WATER MANAGEMENT
Stillage, W74-01325 5A	on the Northwestern Slope of the Caucasus (Balansovaya otsenka resursov podzemnykh	The Role of Universities in Water Resources Education: The Social Sciences, W74-01467 6B
Comparative Evaluation of the Efficacy of	vod severo-zapadnogo sklona Bol'shogo Kav-	
Ozonization and Other Means of Treating Water Containminated With Oil Products (In	kaza), W74-01136 4B	Promoting Environmental Quality Through
Russian), W74-01580 5F	The Mass Balance of the Sea Ice of the Arctic Ocean,	Urban Planning and Controls, W74-01470 5D
Barrier Role of Water Works Installations in	W74-01374 2C	WATER PARTICLE MOTION
Respect to Chemical Contaminations Classified According to Organoleptic Properties of	Short-Term Snow Melt and Ablation Derived	Wave-Induced Water Particle Motion Measure-
Hazards, (In Russian), W74-01584 5D	from Heat- and Mass-Balance Measurements, W74-01380 2C	ments, W74-01285 2E
	The Carbohydrate and Water Balance of Beans	WATER POLLUTION
WATER ALLOCATION (POLICY) Water Resources Planning Mozambique (La	(Vicia faba) Attacked by Broomrape	The Shipowner and Oil Pollution Liability, W74-01447 5G
Planification Des Resources en Eau au Mozamique).	(Orobanche crenata), W74-01575 3F	W74-01447 5G
W74-01629 6B		Water Pollution in Louisiana: An Attempt at
WATER ANALYSIS	Water Use by Perennial Evergreen Plant Com- munities in Australia and Papua New Guinea,	Control, W74-01451 5G
Water. Examination. Assessment. Condition-	W74-01634 2D	Drinking Water,
ing. Chemistry. Bacteriology. Biology, W74-01236 5F	WATER-BASED RECREATION SELECTION PROCESS	W74-01466 5F
Evaluation of the Use of the Heated Graphite	Simulation of Water Recreation Users' Deci-	WATER POLLUTION CONTROL
Atomizer for the Routine Determination of	sions,	Oxnard Basin Experimental Extraction-Type Barrier.
Trace Metals in Water, W74-01316 5A	W74-01464 6D	W74-01289 8B
Wastewater Characterization of Sweet Potato	WATER CHEMISTRY Chemical Relationships Between Surface	Engineer's Report for South Valley Water
Processing,	Water and the Ground in South Florida,	System.
W74-01324 5A	W74-01153 2K	W74-01382 6B

The Interstate Water Pollution CompactPaper	Water Pollution in Louisiana: An Attempt at	Simulating the Behavior of a Multi-Unit, Multi-
Tiger or Effective Regulatory Device,	Control,	Purpose Water-Resource System,
W74-01450 5G	W74-01451 5G	W74-01468 6A
Early Thoughts on Prosecuting Polluters,	Application of Mathematical Modelling to	River Basin Planning in the United States,
W74-01613 5G	Water Quality Management,	W74-01472 6E
W/4-01013	W74-01486 5B	
Federal Water Pollution Control Act Amend-		Regional Water Resources Studies A Spanish
ments of 1972.	Benthic Macroinvertebrates as Indexes of	Experience,
W74-01615 5G	Water Quality in Whetstone Creek, Morrow	W74-01622 4E
	County, Ohio (Scioto River Basin),	WATER RESOURCES DEVELOPMENT
WATER POLLUTION EFFECTS	W74-01517 5B	International Scientific and Technical Coopera
Effects of Paraquat on Invertebrates in a Can-	The Effect of China-Clay Wastes on Stream In-	tion in the Field of Water Problems (Mezhdu
tebury Stream, New Zealand, W74-01298 5C	vertebrates,	narodnoye nauchno-tekhnicheskoye sotrud
W74-01298 3C	W74-01527 5C	nichestvo v oblasti vodnykh problem),
Field and Experimental Studies on the Effects		W74-01138 6E
of a Power Station Effluent on Tubificidae	A Bill Authorizing the State of Illinois and the	
(Oligochaeta, Annelida),	Metropolitan Sanitary District of Greater	Prospects for the Use and Conservation of
W74-01312 5C	Chicago to Increase the Diversion of Water	Water Resources in the USSR (Perspektivy
	from Lake Michigan into the Illinois Waterway.	ispol'zovaniya i okhrany vodnykh resursov
N-Nitrosation by Nitrite Ion in Neutral and	W74-01618 6E	SSSR),
Basic Medium,	WATER QUALITY CONTROL	W74-01387 6E
W74-01328 5B	The Porter-Cologne Water Quality Control Act,	Arizona's Coming Dilemma: Water Supply and
Pathways of Trace Elements in Arctic Lake	and Related Water Code Sections (Containing	Population Growth,
Ecosystems,	the 1971 Amendments).	W74-01452 4A
W74-01401 5B	W74-01461 5G	
		The Porter-Cologne Water Quality Control Act
Effect of Spoil Disposal on Benthic Inver-	Review of Planning for the Grand River	and Related Water Code Sections (Containing
tebrates,	Watershed.	the 1971 Amendments).
W74-01420 5C	W74-01478 5D	W74-01461 50
	WATER QUALITY MANAGEMENT	Hydrologic Engineering Methods for Wate
The Effect of China-Clay Wastes on Stream In-	Water Quality Evaluation of Regionalized	Resources Development. Volume 2. Hydrologic
vertebrates,	Wastewater Systems,	Data Management,
W74-01527 5C	W74-01107 5D	W74-01642 2E
Freshwater Mussel Ecology, Kentucky Lake,		
Tennessee, May 1, 1969-June 15, 1972,	WATER QUALITY STANDARDS	WATER RESOURCES INSITUTUTE
W74-01641 5C	Some Observations on Bacterial Populations in	Graduate Courses Related to Water Resources.
	Wilgreen Lake, Madison, KY.,	W74-01119 9A
WATER POLLUTION SOURCES	W74-01242 5B	WAMER BRICE
Holbrook Cove SurveyA 1972 Student	Drinking Water,	WATER REUSE Recreational Reuse of Municipal Wastewater,
Summer Ocean Engineering Laboratory	W74-01466 5F	W74-01103 SI
Research Project.	W 74-01400 JF	W 74-01103
W74-01131 5B	Federal Water Pollution Control Act Amend-	Study of Water Recovery and Solid Waste
Mercury in the EnvironmentA Global Review	ments of 1972.	Processing for Aerospace and Domestic Appli
Including Recent Studies in the Delaware Bay	W74-01615 5G	cations: Volume 1 - Final Report Summary,
Region,		W74-01280 5I
W74-01373 5B	WATER REQUIREMENTS	WATER CAMPIEC
	Agricultural Water Demand in North Carolina: Phases I and II,	WATER SAMPLES 'Trapped Sea-Water' in Rorholtfjorden,
Leaves as Source of Phosphorus,	W74-01112 6D	W74-01263
W74-01407 5B	W/4-01112 0D	W 74-01203
	WATER RESOURCES	WATER SOURCES
A Cost-Effectiveness Study and Analysis of	Water Resources of the Ural Area and Basic	Icebergs as a Fresh-Water Source: An Ap
Municipal Refuse Disposal Systems,	Problems in Their Complex Use (Vodnyye re-	praisal,
W74-01631 5E	sursy Urala i osnovnyye problemy ikh kom-	W74-01375 20
WATER QUALITY	pleksnogo ispol'zovaniya),	
Urbanization and Its Effects on Regimen and	W74-01135 3E	WATER STORAGE
Quality of Surface Waters (Urbanizatsiya i	Water Bassacce	Determination of the Total Storage Capacity o
yeye vliyaniye na rezhim i kachestvo poverkh-	Water Resources, W74-01168 7C	the Cretaceous Sandstone Aquifers in South Dakota,
nostnykh vod),	W/4-01100	W74-01114 21
W74-01139 4C	Ocean Utilization and Coastal Zone Develop-	W/4-01114
	ment.	WATER SUPPLY
Utilization of Remote Sensing in River Basin	W74-01281 2L	Engineer's Report for South Valley Wate
Studies,		System.
W74-01154 . 5A	Simulation Models for Water-Resource	W74-01382 61
Mobile Oxygen Dispersion Craft,	Systems: Their Utility in Measuring Physical	Daiabia Watan
W74-01232 5G	and Economic Effects of Weather Forecasting	Drinking Water,
11,1-01252	and Weather Modification: Summary Report,	W74-01466 51
Quality of Surface Waters of the United States,	W74-01463 3B	Functional Water and Sewerage Plan and Pro
1968: Parts 4 and 5. St Lawrence River Basin	And Not a Drop to Drink: Water Resources	gram.
and Hudson Bay and Upper Mississippi River	Planning and Administration,	W74-01469 51
Basins.	W74-01465 6E	
W74-01268 2K	m - n - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	Relating Comprehensive Sewer and Wate
Protocos from Dive I also Desul Valend	The Role of Universities in Water Resources	Plans to the County Land Use Plan. Goals, Pol
Protozoa from Blue Lake, Raoul Island,	Education: The Social Sciences,	icies and Standards.

WATER SUPPLY

Tri-Agencies Pipeline: Engineering Report. W74-01477 8A	Water Resources of the Ural Area and Basic Problems in Their Complex Use (Vodnyye re-	WATERWORK RESERVOIRS Protective Function of the Forest in Areas of
	sursy Urala i osnovnyye problemy ikh kom-	Waterwork Reservoirs, (In Czech),
Utility Provisions Analysis for East Central Florida.	pleksnogo ispol'zovaniya), W74-01135 3E	W74-01582 4A
W74-01480 6D		WAVE REFLECTION
Availability of Fresh Water in the East Central	International Scientific and Technical Coopera-	Experimental Study of Wave Reflection by a
Florida Planning Region.	tion in the Field of Water Problems (Mezhdu- narodnoye nauchno-tekhnicheskoye sotrud-	Sloping Beach,
W74-01481 6D	nichestvo v oblasti vodnykh problem),	W74-01223 2E
A Commission Community 1972 Undate (Levine	W74-01138 6E	WAVES (WATER)
A Growing Community: 1973 Update, (Lexington, Kentucky).	Processes for the Use and Consequence of	The Breaking of Waves on a Sloping Beach,
W74-01484 5D	Prospects for the Use and Conservation of Water Resources in the USSR (Perspektivy	W74-01176 2E
State Daniel Charles Courts	ispol'zovaniya i okhrany vodnykh resursov	Beach Changes on the Outer Banks of North
Sketch Development Plan, Chambers County, Alabama.	SSSR),	Carolina,
W74-01485 5D	W74-01387 6B	W74-01179 2E
Protection Francisco of the Francis in Assess of	Water Use by Perennial Evergreen Plant Com-	
Protective Function of the Forest in Areas of Waterwork Reservoirs, (In Czech),	munities in Australia and Papua New Guinea,	Beach Cusps,
W74-01582 4A	W74-01634 2D	W74-01180 2J
	WATER WELLS	South American Marine Energy,
Regional Water Resources Studies A Spanish	Prediction of Well Development Possibilities in	W74-01181 8A
Experience, W74-01622 4B	Delaware by means of Calibrated Gamma-Ray	
	Logs,	A Profile of the Four Moment Measures Per- pendicular to a Shore Line, South Haven,
VATER SUPPLY DEVELOPMENT	W74-01106 4B	Michigan,
Comprehensive Water and Sewer Plan, Ran- dolph County, Illinois.	Hydrogeologic Characteristics of the Valley-	W74-01184 2H
W74-01474 5D	Fill Aquifer in the Weldona Reach of the South	
	Platte River Valley, Colorado, W74-01142 4B	Note on the Equations of Long Waves Over an
Water Master Plan. Eugene-Springfield Ur- banizing Area.	W/4-01142 4B	Uneven Bottom, W74-01189 2E
W74-01479 3D	Numerical Solution of Multiphase Well Flow,	
	W74-01275 8B	Effects of Friction and Surface Tide Angle of
WATER SYSTEM EXPANSION Water Master Plan. Eugene-Springfield Ur-	Shigella Sonnei Isolated from Well Water,	Incidence on the Coastal Generation of Internal
banizing Area.	W74-01551 5A	Tides, W74-01190 2E
W74-01479 3D	WATER YIELD	
VATER TEMPERATURE	Regional Estimate of Brackish- and Saline-	A Note on Edge Waves in a Stratified Fluid,
Thermophilic Ostracod: Aquatic Metazoan with	Groundwater Yield (Regional'naya otsenka	W74-01194 2E
the Highest Known Temperature Tolerance,	ekspluatatsionnykh resursov solonovatykh i	Harbor Analog System, Part I - Waves,
W74-01327 5C	solenykh podzemnykh vod),	W74-01200 2L
Temperature Selection by Juvenile and Adult	W74-01137 4B	
Yellow Perch (Perca Flavescens) Acclimated to	Sensitivity of Groundwater flow Models to	Beach Equilibrium and Second-Order Wave
24 C,	Vertical Variability of Aquifer Constants,	Theory, W74-01201 2E
W74-01353 5A	W74-01151 4B	W/4-01201
Ultrasonic Thermometry,	WATERFLEAS	Long Surf,
W74-01501 7B	Distribution of Alkyl Arsenicals in Model	W74-01203 2E
VATER TREATMENT	Ecosystem,	The Generation of Longshore Currents on a
Water. Examination. Assessment. Condition-	W74-01409 5C	Plane Beach,
ing. Chemistry. Bacteriology. Biology,	WATERSHED MANAGEMENT	W74-01208 2L
W74-01236 5F	Hydrologic Nutrient Cycle Interactions in	Observations and Residents on Galifern
The Characteristics of the Raw Waters of	Undisturbed and Manipulated Ecosystems (Watersheds),	Observations and Experiments on Solitary Wave Deformation,
Hasdeo River and Dhengur Nala at Korba (M.	W74-01110 4C	W74-01215 8B
P.),		
W74-01240 5A	Objective Regionalization of Peak Flow Rates, W74-01174 4D	Edge Waves Over a Sloping Beach in a Rotat-
Sensitivity of Three Selected Bacterial Species	W74-01174 4D	ing Two-Layered System, W74-01218 2E
to Ozone,	Review of Planning for the Grand River	W/4-01210
W74-01553 5F	Watershed.	Experimental Study of Wave Reflection by a
Effect of Partial Defluoridation of a Water	W74-01478 5D	Sloping Beach,
Supply on Dental Fluorosis: Final Results in	Tallulah Creek Watershed (Long Creed Por-	W74-01223 2E
Bartlett, Texas, After 17 Years,	tion) Graham County, North Carolina (Final	Wave-Induced Water Particle Motion Measure-
W74-01578 5F	Environmental Impact Statement). W74-01621 4D	ments,
Comparative Evaluation of the Efficacy of		W74-01285 2E
Ozonization and Other Means of Treating	WATERSHEDS (BASINS)	Longshore Current Generation by Obliquely In-
Water Containminated With Oil Products (In Russian),	Hydrologic Nutrient Cycle Interactions in Undisturbed and Manipulated Ecosystems	cident Internal Waves,
W74-01580 5F	(Watersheds),	W74-01650 2E
	W74-01110 4C	WEATHER
WATER UTILIZATION Agricultural Water Demand in North Carolina:	Physical System Modelling as a Tool in Water	Population Dynamics of Pond Zooplankton, I
Phases I and II,	Resource Planning,	Diaptomus pallidus Herrick,
W74-01112 6D	W74-01487 2A	W74-01502 50

WELLETTONE	WILD RIVER ACT	YTTRIUM
WEATHER CONDITIONS Effects of Shading and of Seasonal Differences	Designating a Segment of the St. Croix as Part	State of Rare Earth Elements in Surface
in Weathering on the Growth, Sugar Content	of Wild and Scenic Rivers System.	Waters (O sostoyanii redkozemel'nykh elemen
and Sugar Yield of Sugar Beet Crops, W74-01229 3F	W74-01619 6E	tov v poverkhnostnykh vodakh), W74-01395
W/4-01229 3F	WILD RIVERS	47-01373
WEATHER FORECASTING	Report of Attitudes and Opinions of Recrea-	YUGOSLAVIA
Simulation Models for Water-Resource	tionists Towards Wild and Scenic Rivers: A	The Influence of Some Climatic Factors on th
Systems: Their Utility in Measuring Physical	Case Study of the St. Joe River,	Productivity of Red Clover Seed, (In Serbo Croatian),
and Economic Effects of Weather Forecasting	W74-01102 6B	W74-01556 31
and Weather Modification: Summary Report, W74-01463 3B	WINBERG FORMULAS	
W/4-01403	Production of Crustacean Zooplankton in Moty	ZETA POTENTIAL
WEATHER MODIFICATION	Bay, Lake Jeziorak: The method of Production	Anion Responses and Potential Functions for Neutral Carrier Membrane Electrodes.
Simulation Models for Water-Resource	Estimation, W74-01172 2H	W74-01334 21
Systems: Their Utility in Measuring Physical	W/4-011/2 2h	***************************************
and Economic Effects of Weather Forecasting	Production of Crustacean Zooplankton in Moty	Glass-Metal Composite Electrodes,
and Weather Modification: Summary Report, W74-01463 3B	Bay, Lake Jeziorak: II. Estimation of Produc-	W74-01512 21
	tion of the Predominating Species,	ZINC
WEATHER PATTERNS	W74-01173 2H	Investigations on the Changes in the Content of
Precipitation Variability Over North Carolina,	WIND EROSION	Heavy Metals in Lake Waters of the Masuria
W74-01111 2B	On the Formation of Small Marginal Lakes on	Lake District,
Coastal Processes and Beach Dynamics at	the Juneau Icefield, South-Eastern Alaska,	W74-01221 51
Sheboygan, Wisconsin, July, 1972,	U.S.A.,	A Comparison of Fast Destruction Methods for
W74-01130 2H	W74-01379 2C	the Determination of Trace Metals in Biologica
	WIND TIDES	Materials,
WEED CONTROL	Effects of Reefs and Bottom Slopes on Wind	W74-01317 5.
Effects of Leaf-Footed Bugs on Mesquite	Set-Up in Shallow Water,	An Automated Method for the Derteminatio
Reproduction, W74-01638 4A	W74-01182 2J	of Trace Amounts of Metal Ions by Ion
W/4-01036 4A	Comments of Walter Washing	Exchange Chromatography. Determination of
WEIGHT	Currents at Toledo Harbor, W74-01214 2H	zinc (II) in Waters,
Relation Between Total Body Weight and Con-	W/4-01214 2H	W74-01438 5
centrations of Manganese, Iron, Copper, Zinc,	WINDS	Concentrations of Some Trace Metals i
and Mercury in White Muscle of Bluefish (Po-	The Union of the Columbia River and the	Pelagic Organisms and of Mercury in Northeast
matomus saltatrix) and A Bathyl-Dimersal Fish	Pacific Ocean General Features,	Atlantic Ocean Water,
Antimora Rostrata,	W74-01183 2L	W74-01523 56
W74-01413 5B	WINERY WASTES	
WELL DEVELOPMENT PREDICTION	Characterization and Treatability of Pomace	Particulate Metals in Waters of Sorfjord Wes
Prediction of Well Development Possibilities in	Stillage,	Norway, W74-01528 5
Delaware by means of Calibrated Gamma-Ray	W74-01325 5A	W 14-01320
Logs,	WISCONSIN	ZOO BENTHOS
W74-01106 4B	Coastal Processes and Beach Dynamics at	Zoobenthos of the Azov Sea After the Contro
WELL WATER	Sheboygan, Wisconsin, July, 1972,	of THE Don River, (In Russian), W74-01257 2
Effect of the Quality of Well Waters on Soils in	W74-01130 2H	W 14-01257
Gurgaon District,	Floodland and Sharehard Davidson and Cuids	ZOO PLANKTON
W74-01252 2G	Floodland and Shoreland Development Guide. W74-01483	Oxbow Cut-Off Bog Lake Zooplankton of th
WEST BARTSTAN (INDITE BASIN)	W/4-01403	Kolyma Basin (In Russian),
WEST PAKISTAN (INDUS BASIN) Irrigation Waters of the Indus Plains and Their	Designating a Segment of the St. Croix as Part	W74-01265
Salt Load,	of Wild and Scenic Rivers System.	ZOOPLANKTON
W74-01639 3C	W74-01619 6E	Relationships Between Turbidity and Hydro
	X-RAY ANALYSIS	graphical Factors in Fresh and Brackish Water
WETLANDS	Particulate Metals in Waters of Sorfjord West	Region of the Elbe Estuary, (In German),
Chemical Relationships Between Surface	Norway,	W74-01260 5
Water and the Ground in South Florida, W74-01153 2K	W74-01528 5B	Revision of Family and Some Generic Defin
W/4-01135 2K	YAQUINA ESTUARY (ORE.)	tions in the Phaennidae and Scolecithricida
Virginia Natural Resources Law and the New	Diatom Associations in Yaquina Estuary,	(Copepoda: Calanoida),
Virginia Wetlands Act,	Oregon : A Multivariate Analysis,	W74-01308 5.
W74-01448 2L	W74-01430 5B	Zooplankton in Kolyma-Indigirka Lakes (1
Valuation of Visual-Cultural Benefits from	WE - OFG	Russian),
Freshwater Wetlands in Massachusetts.	YEASTS	W74-01341 2
W74-01643 6B	Viability of Lyophilized Microorganisms after Storage,	Population Dynamics of Pond Zooplankton,
	W74-01538 5C	Diaptomus pallidus Herrick,
WHEAT		W74-01502 5
Water Requirements of Wheat and Cotton on a	Computer Identification of Yeasts of the Genus	
High Water Table Soil Under Arid Conditions, W74-01595 3F	Saccharomyces,	ZOOPLANKTON PATCHINESS
W74-01595 3F	W74-01646 5A	The Distribution, Composition and Biomass of
WHETSTONE CREEK (OHIO)	YTTERBIUM	the Crustacean Zooplankton Population i Western Lake Superior,
Benthic Macroinvertebrates as Indexes of	State of Rare Earth Elements in Surface	W74-01109 5
Water Quality in Whetstone Creek, Morrow	Waters (O sostoyanii redkozemel'nykh elemen-	,
County, Ohio (Scioto River Basin),	tov v poverkhnostnykh vodakh),	
W74-01517 5B	W74-01395 2K	



AUTHOR INDEX

ABERNATHY, G. H.	ANGEL, G. P.	BAKER, R. K.
Brush Eradicating, Basin Pitting, and Seeding	Modified Delves Cup Atomic Absorption	Determination of the Total Storage Capacity of
Machine for Arid to Semiarid Rangeland,	Determination of Lead in Blood,	the Cretaceous Sandstone Aquifers in South
W74-01637 4A	W74-01415 5A	Dakota,
		W74-01114 2F
ABRAHAM, R. L.	ANGINO, E. E.	BALASHOV, L. S.
Solvent Extraction of Metal 1,10-	Population Dynamics of Pond Zooplankton, I.	Peat Floating in the Reservoir of the Kiev
Phenanthroline Complexes and Concentration of Trace Amounts of Metal Ions Prior to Spec-	Diaptomus pallidus Herrick,	Hydroelectric Station and its Role in Water
trophotometric or Flame Photometric Deter-	W74-01502 5C	Contamination, (in Russian),
mination.	ANTHEUNISSE, J.	W74-01352 5B
W74-01354 5A	Viability of Lyophilized Microorganisms after	
711	Storage,	BALLWEG, J. A.
ACKERS, P.	W74-01538 5C	Concept-Scale Interaction with the Semantic
Sediment Transport: New Approach and Anal-	W/4-01330	Differential Technique, W74-01644 6B
ysis,	APPLEGATE, R. L.	W/4-01044 0B
W74-01279 2J	Nutrient Sources and Transport in the Upper	BANERJEE, C. D.
ADAMC D I	and Central Regions of the Big Sioux River,	The Characteristics of the Raw Waters of
ADAMS, B. J. Water Quality Evaluation of Regionalized	W74-01115 5B	Hasdeo River and Dhengur Nala at Korba (M.
Wastewater Systems,		P.),
W74-01107 5D	ARMITAGE, K. B.	W74-01240 5A
W/4-0110/	Population Dynamics of Pond Zooplankton, I.	BARBER, R. T.
ADAMS, F. S.	Diaptomus pallidus Herrick,	Relation Between Total Body Weight and Con-
Element Constitution of Selected Aquatic	W74-01502 5C	centrations of Manganese, Iron, Copper, Zinc,
Vascular Plants from Pennsylvania: Submersed	ARTHUR, R. S.	and Mercury in White Muscle of Bluefish (Po-
and Floating Leaved Species and Rooted Emer-	The Equations of Continuity for Seawater and	matomus saltatrix) and A Bathyl-Dimersal Fish
gent Species,	River Water in Estuaries,	Antimora Rostrata,
W74-01526 5A		W74-01413 5B
	W74-01207 2L	PARROUR M. C.
ADDISON, R. F.	ARUTYUNYANTS, R. R.	BARBOUR, M. G. Autecology of Atriplex polycarpa from Califor-
Variation of Organochlorine Residue Levels	Isotopic Composition of Oxygen and Hydrogen	nia,
with Age in Gulf of St. Lawrence Harp Seals	in Sulfide Waters of the Sochi-Adler Artesian	W74-01259 2I
(Pagophilus Groenlandicus), W74-01300 5A	Basin (Izotopnyy sostav kisloroda i vodorada	W 74-01257
W/4-01300 3A	sul'fidnykh vod Sochi-Adlerskogo artezian-	Desert Dogma Reexamined: Root/Shoot
AHMAD, S.	skogo basseyna),	Productivity and Plant Spacing,
Water Requirements of Wheat and Cotton on a	W74-01394 2K	W74-01585 2I
High Water Table Soil Under Arid Conditions,		BARICA, J.
W74-01595 3F	ASTON, R. J.	Reliability of an Ammonia Probe for Elec-
	Field and Experimental Studies on the Effects	trometric Determination of Total Ammonia
AHUJA, L. R.	of a Power Station Effluent on Tubificidae	Nitrogen in Fish Tanks,
Effect of Portland Cement on Soil Aggregation	(Oligochaeta, Annelida),	W74-01433 5A
and Hydraulic Properties,	W74-01312 5C	
W74-01576 2G	ATKINSON, H. J.	BARNARD, W. M.
ALEXANDER, M.	An Oxygen Electrode Microrespirometer,	Evaluation of the Use of the Heated Graphite Atomizer for the Routine Determination of
2,4-dichlorophenoxyacetate metabolism by	W74-01419 5A	Trace Metals in Water,
Arthrobacter sp.: Accumulation of a Chlorobu-		W74-01316 5A
tenolide,	ATLAS, R. M.	
W74-01550 5B	Inhibition by Fatty Acids of the Biodegradation	BARNETT, L.
	of Petroleum,	Fluorometric Quantitation of Gallium in Biolog-
ALFORD, W. L.	W74-01537 5B	ical Materials at Nanogram Levels,
Interpretation Techniques Development,		W74-01344 2K
W74-01170 7B	AVSYUK, G. A.	BARSDATE, R. J.
ALLEY, C. C.	Problems in Hydrology of Glaciers and	Pathways of Trace Elements in Arctic Lake
Practical Methods for Derivatizing and Analyz-	Glacierized Areas (Problemy gidrologii led- nikov i lednikovykh rayonov),	Ecosystems,
ing Bacterial Metabolites with a Modified Auto-	W74-01132 2C	W74-01401 5B
matic Injector and Gas Chromatograph,	W/4-01132	BARTHA B
W74-01336 5A	AWASTHI, S.	BARTHA, R. Inhibition by Fatty Acids of the Biodegradation
11 W C	Crop Rotation Schemes for Optimal Utilization	of Petroleum,
ALVIS, C.	of Agricultural Land,	W74-01537 5B
Changes in Species Composition of	W74-01596 3F	
Phytoplankton Due to Enrichment by N, P, and Si of Water From a North Florida Lake,		BARTHEL, W. F.
W74-01503 5C	AZIMI, B.	Modified Delves Cup Atomic Absorption
30	Soil and Water Conservation on Arable Lands,	Determination of Lead in Blood,
ANDRE, C. E.	W74-01633 3F	W74-01415 5A
Precolumn Inlet System for the Gas Chromato-	BAPRECUPB M I	BARY, R. P.
graphic Analysis of Trace Quantities of Short-	BAEDECKER, M. J.	Factors Affecting the Distribution of Some
Chain Aliphatic Amines,	C 18-Isoprenoid Ketone in Recent Marine Sedi-	Phryganeaeid (Trichoptera) in Malham Tarn,
W74-01357 5A	ment, W74-01301 5A	Yorkshire,
ANFALT, T.	W74-01301 5A	W74-01586 21
The Potentiometric Titration of Potassium in	BAJORUNAS, L.	BAYNE, C. K.
Sea Water with a Valinomycin Electrode,	Shifting Offshore Bars and Harbor Shoaling,	Precipitation Variability Over North Carolina,
31774 01440	3774 01101	W.W. 01111

5A

5A

BEARD, L. R.	BEVILL, R. F.	BOWEN, A. J.
Hydrologic Engineering Methods for Water Resources Development. Volume 2. Hydrologic	The Determination of Thallium in Urine and Plasma by Delves Cup Atomic Absorption,	The Generation of Longshore Currents on a Plane Beach,
Data Management,	W74-01314 5A	W74-01208 2L
W74-01642 2E		
BECKER, L.	BHATTACHARYYA, G. S.	BOYD, C. E.
Linear Programming and Channel Flow	The Characteristics of the Raw Waters of Hasdeo River and Dhengur Nala at Korba (M.	The Chemical Oxygen Demand of Waters and Biological Materials from Ponds,
Identification,	P.),	W74-01543 5C
W74-01277 8B	W74-01240	
BEDNARZ, T.	PURIOU G P	BOYER, J. S.
Selected Species of Algae Found in Carp Ponds	BIELBY, G. H. The Effect of China-Clay Wastes on Stream In-	Sensitivity of Cell Division and Cell Elongation to Low Water Potentials in Soybean
of the Laskowa Complex Near Zator,	vertebrates,	Hypocotyls,
W74-01607 2I	W74-01527 5C	W74-01249 3F
BELLY, R. T.	BURD D M	PRINCES I
Algal Excretion of C-14-Labeled Compounds	BIER, D. M. Versatile Computer Generated Variable Ac-	BRADFORD, J. Revision of Family and Some Generic Defini-
and Microbial Interactions in Cyanidium cal-	celerating Voltage Circuit for Magnetically	tions in the Phaennidae and Scolecithricidae
darium Mats, W74-01510 5C	Scanned Mass Spectrometers. Use for Assays	(Copepoda: Calanoida),
W 74-01510	in the Picogram Range and for Assays of Stable	W74-01308 5A
BEN-YAAKOV, S.	Isotope Tracers,	BRADLEY, C. C.
Nitrogen/Argon Ratios by Difference Thermal	W74-01335 2K	Comparison of the Snow Resistograph with the
Conductivity, W74-01522 5A	BIGGS, R.	Ram Penetrometer,
77	Effect of Spoil Disposal on Benthic Inver-	W74-01381 2C
BEN-ZVI, A.	tebrates,	BREYER, A. C.
Hydrodynamic Modeling of Two-Dimensional Watershed Flow,	W74-01420 5C	A Systematic Study of the Variables Involved
W74-01278 2A	BILOZOR, W.	in the Reverse-Phase Thin-Layer Chromatog-
	Single-Velocity Method in Measuring	raphy of Oxyethylated Alkyl Sulfate Surfac-
BENNETT, E. R.	Discharge,	tants,
A Modified Filtration Method for the Analysis of Wastewater Suspended Solids,	W74-01161 2C	W74-01358 5A
W74-01318 5A	BJORK, S.	BRINCKMAN, F. E.
BEDC P	Swedish Lake Restoration Program Gets	Biodegradation of Phenylmercuric Acetate by
BERG, E. Seismic Evidence for Glacier Motion,	Results,	Mercury-Resistant Bacteria,
W74-01378 2C	W74-01262 5G	W74-01555 5B
DED CHAN II I	BLACK, R.	BRION, D. J.
BERGMAN, H. L. Uptake of Methyl Mercuric Chloride and Mer-	Growth Rates of Intertidal Molluscs as Indica-	Virginia Natural Resources Law and the New
curic Chloride by Trout: A Study of Uptake	tors of Effects of Unexpected Incidents of Pol-	Virginia Wetlands Act,
Pathways into the Whole Animal and Uptake	lution, W74-01434 5C	W74-01448 2L
by Erythrocytes in Vitro, W74-01412 5C	11 17 01737	BRISOU, J.
W74-01412 5C	BLAIR, W.	A Diseased Trout: Microbiological Study of Its
BERGSIMA, J.	Biodegradation of Phenylmercuric Acetate by	Principal Organs and Its Environment, W74-01267 5C
Physical System Modelling as a Tool in Water Resource Planning,	Mercury-Resistant Bacteria, W74-01555 5B	W74-01267 5C
W74-01487 2A		BROADWATER, W. T.
	BLUMSACK, S. L.	Sensitivity of Three Selected Bacterial Species
BERGSTROM, S. Development of A Conceptual Deterministic	The Transverse Circulation Near a Coast, W74-01206 2E	to Ozone, W74-01553 SF
Rainfall-Runoff Model,	W/4-01200	W 74-01555
W74-01128 2A	BOLES, J. H.	BROCK, T. D.
BERLYNE, G. M.	Anion Responses and Potential Functions for	Algal Excretion of C-14-Labeled Compounds
Metabolic Effects of Drinking Brackish Water,	Neutral Carrier Membrane Electrodes, W74-01334 2K	and Microbial Interactions in Cyanidium cal- darium Mats,
W74-01632 5C		W74-01510 5C
BEDMAN T	BORODULINA, A. A.	
BERMAN, T. Modifications in Filtration Methods for the	Water Regime of Sunflower Under Different	BRODINE, V. Drinking Water,
Measurement of Inorganic C-14 Uptake by	Conditions of Phosphorus Nutrition, (In Russian),	W74-01466 SF
Photosynthesizing Algae,	W74-01227 3F	
W74-01425 5A		BROOKS, J. B.
BERNARD, J. G.	BOSE, E. A. Thermal and Base-Catalyzed Hydrolysis	Practical Methods for Derivatizing and Analyz- ing Bacterial Metabolites with a Modified Auto-
The Planktonic Association (Cladocera and	Products of the Systemic Fungicide, Benomyl,	matic Injector and Gas Chromatograph.
Copepoda) of a Dimictic Lake of the Lau- rentides Park, Quebec, (In French),	W74-01504 5B	W74-01336 5A
W74-01558 2H		
	BOUCHARD, A. Determination of Mercury After Room Tem-	BROOKS, R. R. Natural Dispersion of Mercury from Puhipuhi,
BERTINE, K. K.	perature Digestion by Flameless Atomic Ab-	Northland, New Zealand,
Simultaneous Determination of Manganese, Copper, Arsenic, Cadmium, Antimony and	sorption,	W74-01307 5B
Mercury in Glacial Ice by Radioactivation,	W74-01315 5A	
W74-01361 5A	BOULGER, J.	BROWN, L. R. Comparison of Gelman and Millipore Mem-
BEST, D. J.	An Improved Method of Cell Enumeration for	brane Filters for Enumerating Fecal Coliform
Extended Tables for Kendall's Tau,	Filamentous Algae and Bacteria,	Bacteria,
W74-01497 7C	W74-01421 5A	W74-01554 5A

BROWN, T. J.	CALLELY, A. G.	Water Containinated With Oil Products (In
Protozoa from Blue Lake, Raoul Island,	The Role of Micro-Organisms in Waste Tip-	Russian),
W74-01310 5C	Lagoon Systems Purifying Coke-Oven Ef-	W74-01580 5F
BRUCE, W. N.	fluents, W74-01647 5D	CHERNYAYEV, A. M.
Chlorinated Hydrocarbon Insecticides in Sedi-	W/4-0104/	Water Resources of the Ural Area and Basic
ments of Southern Lake Michigan,	CALVERT, S. E.	Problems in Their Complex Use (Vodnyye re-
W74-01397 5B	Particulate Metals in Waters of Sorfjord West	sursy Urala i osnovnyye problemy ikh kom-
	Norway,	pleksnogo ispol'zovaniya),
Isotopic Composition of Helium in Thermal	W74-01528 5B	W74-01135 3E
Springs of Iceland (Izotopnyy sostav geliya ter- mal'nykh istochnikov Islandii),	CAMFIELD, F. E.	CHERRY, J. A.
W74-01396 2K	Observations and Experiments on Solitary	Sand Movement Along Equilibrium Beaches
m. rotare	Wave Deformation,	North of San Francisco,
Separation and Identification of Carbofuran,	W74-01215 8B	W74-01213 2J
Its Metabolites, and Conjugates Found in Fish	CAMPBELL, I.	
Exposed to Ring C-14-Labeled Carbofuran	Computer Identification of Yeasts of the Genus	CHOW, V. T.
Using ITLC Silica Gel Strips, W74-01577 5A	Saccharomyces,	Hydrodynamic Modeling of Two-Dimensional Watershed Flow,
W74-01577 5A	W74-01646 5A	W74-01278 2A
BRUTSAERT, W.		W/7-012/0
Numerical Solution of Multiphase Well Flow,	CAMPBELL, W. J.	CHRISTIAN, G. D.
W74-01275 8B	Icebergs as a Fresh-Water Source: An Ap-	Simple Inexpensive Freeze-Drying Procedure,
	praisal, W74-01375 2C	W74-01339 7B
BRYUKHANOV, A. V.	W14-01515	
Geophysical Measurements of the Thickness of	CARVER, R. E.	CHRISTIE, J. H.
the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy	Stratigraphy and Economic Geology of the	Analytical Applications of Pulsed Voltammetric
Azau),	Coastal Plain of the Central Savannah River	Stripping at Thin Film Mercury Electrodes, W74-01514 5A
W74-01390 2C	Area, Georgia,	W 14-01514
	W74-01122 2J	CHRISTOPHERSEN, K.
BUCK, R. P.	CASTENHOLZ, R. W.	Report of Attitudes and Opinions of Recrea-
Anion Responses and Potential Functions for	Thermophilic Ostracod: Aquatic Metazoan with	tionists Towards Wild and Scenic Rivers: A
Neutral Carrier Membrane Electrodes,	the Highest Known Temperature Tolerance,	Case Study of the St. Joe River,
W74-01334 2K	W74-01327 5C	W74-01102 6B
BURAVCHUK, N. I.	CATHERINES, J. J.	CHU, A.
Study of Soil Plasticity over a wide Range of	Using Computers to Analyze Continuous Data,	Microdetermination of Chloro-S-Triazines in
Soil Moisture Contents,	W74-01520 7C	Soil by Gas-Liquid Chromatography with
W74-01636 2G		Nickel Electron Capture or Electrolytic Con-
	CERAME-VIVAS, M. J.	ductivity Detection,
BURNET, A. M. R.	The Circulation of Surface Waters in Raleigh	W74-01304 5A
Effects of Paraquat on Invertebrates in a Can-	Bay, North Carolina, W74-01210 2L	CLARK, J. A.
tebury Stream, New Zealand, W74-01298 5C	W/4-01210 2L	Flow Visualization in Free Shear Layers,
	CHADWICK, T. H.	W74-01271 8B
BURNHAM, J. C.	Characterization and Treatability of Pomace	
An Improved Method of Cell Enumeration for	Stillage,	CLEVENSON, S. A.
Filamentous Algae and Bacteria,	W74-01325 5A	Using Computers to Analyze Continuous Data,
W74-01421 5A	CHAPMAN, M. A.	W74-01520 7C
BURRELL, D. C.	A New Species of Boeckella (Copepoda: Cala-	CLIFFORD, H. F.
Soluble Aluminum in Marine and Fresh Water	noida) from Northland, New Zealand,	Assessment of Two Mesh Sizes for Interpreting
by Gas-Liquid Chromatography,	W74-01309 5A	Life Cycles, Standing Crop, and Percentage
W74-01446 5A	CHAU, A. S. Y.	Composition of Stream Insects,
	Herbicide Analysis: Relationship Between	W74-01601 2I
BURTON, J. D.	Molecular Structure and Retention Index,	CLINE I D
Concentrations of Some Trace Metals in Pelagic Organisms and of Mercury in Northeast	W74-01416 5A	CLINE, J. D. Nitrogen/Argon Ratios by Difference Thermal
Atlantic Ocean Water,		Conductivity,
W74-01523 5C	CHAUVIN, J. V.	W74-01522 5A
	The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a	
BUTTRILL, W. H.	Flameless Wire Loop Atomizer,	COCKS, J. A.
Collaborative Study of a Colorimetric Method	W74-01363 5A	The Effect of Aldrin on Water Balance in the
for Determining Arsenic Residues in Red Meat and Poultry.		Freshwater Pulmonate Gastropod
W74-01403 5A	CHEN, J.Y. T.	(Biomphalaria glabrata), W74-01525 SC
JA	Infrared Studies of Chlorinated Dibenzo-p- Dioxins and Structurally Related Compounds,	30
BYKOV, V. D.	W74-01509 SA	COHN, S.
Prospects for the Use and Conservation of		Promoting Environmental Quality Through
Water Resources in the USSR (Perspektivy	CHERKINSKII, S. N.	Urban Planning and Controls,
ispol'zovaniya i okhrany vodnykh resursov SSSR),	Barrier Role of Water Works Installations in	W74-01470 5D
SSSR), W74-01387 6B	Respect to Chemical Contaminations Classified	COLE, H. JR
ов	According to Organoleptic Properties of Hazards, (In Russian),	Element Constitution of Selected Aquatic
CAIRNS, E. J.	W74-01584 5D	Vascular Plants from Pennsylvania: Submersed
Food Consumption of the Free-Living Aquatic		and Floating Leaved Species and Rooted Emer-
Nematode Pelodera Chitwoodi,	Comparative Evaluation of the Efficacy of	gent Species,
W74-01225 5A	Ozonization and Other Means of Treating	W74-01526 5A

AUTHOR INDEX

COLE, R. A.

COLE, R. A.	CROSS, F. A.	DAVEY, L. M.
Stream Community Response to Nutrient En-	Relation Between Total Body Weight and Con-	A Waterborne Actinomycete Resembling
richment,	centrations of Manganese, Iron, Copper, Zinc,	Strains Causing Mycetoma,
W74-01499 5C	and Mercury in White Muscle of Bluefish (Po-	W74-01256 5B
COLMAN, B.	matomus saltatrix) and A Bathyl-Dimersal Fish	DAVIS, D. G.
Loss of Photosynthetic Activity in Two Blue-	Antimora Rostrata, W74-01413 5B	The Determination of Lead and Nickel by
Green Algae as a Result of Osmotic Stress,	W/4-01415	Atomic-Absorption Spectrometry with a
W74-01302 5B	CROSSLAND, J.	Flameless Wire Loop Atomizer,
COLUMN N. N.	Drinking Water,	W74-01363 5A
COLSTON, N. V. Wastewater Characterization of Sweet Potato	W74-01466 5F	DAVIS, R. A. JR
Processing,	CROSSON, P. R.	Coastal Processes and Beach Dynamics at
W74-01324 5A	Impact of Irrigation Investments on Regional	Sheboygan, Wisconsin, July, 1972,
COLUMN B M	and Urban Development,	W74-01130 2H
COLVIN, B. M. Gas-Liquid Chromatographic Determination of	W74-01625 6B	DAWSON, W. A.
Chlorpyriphos in Dursban Insecticide Formula-	CRUICKSHANK, A.	The Relations of Periphytic and Planktonic
tions,	Ethylenethiourea Degradation,	Algal Growth in an Estuary to Hydrographic
W74-01405 5A	W74-01340 5B	Factors,
COLWELL, R. R.		W74-01571 5C
Biodegradation of Phenylmercuric Acetate by	CULKIN, F.	DAY, J. C.
Mercury-Resistant Bacteria,	Concentrations of Some Trace Metals in	A Linear Programming Approach to Floodplain
W74-01555 5B	Pelagic Organisms and of Mercury in Northeast Atlantic Ocean Water,	Land Use Planning in Urban Areas,
CONCER N I	W74-01523 5C	W74-01490 3E
CONGER, N. L. Choosing a Static Inverter System,		DE ATAIDE FONSECA, C. D.
W74-01547 7B	CURL, H. JR	Water Resources Planning Mozambique (La
	Spectral Absorption of Solar Radiation in Al- pine Snowfields,	Planification Des Resources en Eau au
CONSELMAN, F. B.	W74-01626 2C	Mozamique),
Underground Storage of Texas Playa Lake		W74-01629 6E
Waters by Injection Into the Ogallala Forma- tion Under Moderate Pump Pressure,	CURLIN, J. W.	DE WREEDE, R. E.
W74-01627 4B	The Interstate Water Pollution CompactPaper	New Records of Sargassum Hawaiiensis Doty
	Tiger or Effective Regulatory Device, W74-01450 5G	and Newhouse (Sargassaceae, Phaeophyta),
CONWAY, J. B.	W74-01450 5G	Deep Water Species,
The Distribution, Composition and Biomass of the Crustacean Zooplankton Population in	CURTIS, J. B. JR	W74-01349 2
Western Lake Superior,	Sr-87/Sr-86 Ratios and Total Strontium Con-	DECOURSEY, D. G.
W74-01109 5C	centrations in Surface Waters of the Scioto	Objective Regionalization of Peak Flow Rates,
	River Drainage Basin, Ohio, W74-01516 5B	W74-01174 4E
COOPER, P.	W/4-01310	DEGRAFT-JOHNSON, K. T.
Turbulent Fluid Friction of Rotating Disks, W74-01640 8C	CZACHOR, J. S.	Estimation of Domain Means Using Two-Phase
W/4-01040	Heavy Metals in Wastewater and Treatment	Sampling,
COPELAND, T. R.	Plant Effluents, W74-01319 5A	W74-01498 71
Analytical Applications of Pulsed Voltammetric	W/4-01319	DEL MORAL, R.
Stripping at Thin Film Mercury Electrodes, W74-01514 5A	DALE, J.	The Vegetation of Findley Lake Basin,
W14-01514	Variation of Organochlorine Residue Levels	W74-01587 50
COREY, G. L.	with Age in Gulf of St. Lawrence Harp Seals	
Relationship of Pumping Lift to Economic Use	(Pagophilus Groenlandicus), W74-01300 5A	DEMAYO, A.
of Groundwater for Irrigation, W74-01120 4B	W/4-01300	Storage and Processing of Water Quality Data, W74-01293
W74-01120 4B	DAMBACH, C. A.	W74-01293 70
COWEN, W. F.	Benthic Macroinvertebrates as Indexes of	DENNY, J. L.
Leaves as Source of Phosphorus,	Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin),	A Stochastic Model of Streamflow Based or
W74-01407 5B	W74-01517 5B	the Theory of Functions of Markov Processes,
CRAWFORD, D. A.	38	W74-01123 2F
Underground Storage of Texas Playa Lake	DAS, S. M.	DESAI, B. M.
Waters by Injection Into the Ogallala Forma-	A First Record of Red-Water Phenomenon in	Economics of Resource Use on Sample Farm
tion Under Moderate Pump Pressure,	Kashmir, India, W74-01564 5C	of Central Gujarat,
W74-01627 4B		W74-01491 31
CRAWFORD, T. J.	DAUM, P. H.	DEVRIES, R. N.
Stratigraphy and Economic Geology of the	Double Pulse Coulostatics,	Sensitivity of Groundwater flow Models to
Coastal Plain of the Central Savannah River	W74-01511 2K	Vertical Variability of Aquifer Constants,
Area, Georgia, W74-01122 2J	DAVAR, K. S.	W74-01151 41
W74-01122 2J	Computer Utilization of Hydrological Data for	DI GIANO, F. A.
CREA, W.	North Nashwaaksis Representative Basin,	Mathematical Modeling of Nutrient - Trans
Agriculture, Forestry, Range Resources,	W74-01294 7C	port,
W74-01164 3F	DAVENBORT D.C.	W74-01121 51
CROOKS, J. E.	DAVENPORT, D. C. Potential Usefulness of Antitranspirants for	DICKINSON, W. T.
Simple Direct Combination of Gas Chromatog-	Solution of Some Water Supply, Plant Growth,	Data Acquisition and Storage for Research
raphy and Vapor Phase Infrared Spectrometry,	and Environmental Problems,	Watersheds,
W74-01355 5A	W74-01105 3B	W74-01295 76

DINA, S. J. Carbon Dioxide Exchange by Several Stream- Side and Scrub Oak Community Species of Red	EDWARDS, J. F. Adsorption of Colloidal Iron by Bacteria, W74-01253 5B	FAKTOROVICH, K. A. Increase of Resistance of Carp to Dropsy by Means of Breeding. II. Course of Selection and
Butte Canyon, Utah, W74-01590 2I	EKSBORG, S.	Evaluation of the Breed Groups, (In Russian), W74-01560 5C
********	Ion Pair Partition Chromatography of Organic	
Seasonal Water Potential Patterns in the Mountain Brush Zone, Utah,	Ammonium Compounds, W74-01496 5A	FALK, M. R. Unusual Occurrence of the Brook Stickleback
W74-01588 2I	ELFERS, K.	(Culaea inconstans) in the Mackenzie River,
DOBBS, R. A. New Detector for Ion-Exchange Chromatog-	Promoting Environmental Quality Through Urban Planning and Controls,	Northwest Territories, W74-01589 2I
raphy,	W74-01470 5D	FARMER, H. G.
W74-01343 5A		Effects of Friction and Surface Tide Angle of
DOLAN, R.	ELIASSON, J.	Incidence on the Coastal Generation of Internal Tides.
Beach Changes on the Outer Banks of North	Reservoir Mechanism in an Aquifer of Arbitra- ry Boundary Shape.	W74-01190 2E
Carolina,	W74-01129 2F	
W74-01179 2E		FASSEL, V. A. Lateral Diffusion Interferences in Flame
DOMENICO, P. A.	ELLERMEIER, R. Spectral Absorption of Solar Radiation in Al-	Atomic Absorption and Emission Spec-
On the Optimal Operation of Groundwater	pine Snowfields,	trometry,
Basins: A Calculus of Variations Approach,	W74-01626 2C	W74-01342 2K
W74-01489 4B	DIAPPAR D 14	FERGUSON, H. L.
DROOP, M. R.	EMERY, R. M. The Relations of Periphytic and Planktonic	Processing and Storage of Hydrometeorological
Some Thoughts on Nutrient Limitation in Algae,	Algal Growth in an Estuary to Hydrographic Factors,	Data in the Atmospheric Environment Service, W74-01290 7C
W74-01428 5C	W74-01571 5C	PPDDART T
DUANE, D. B.	ENGDAHL, B. S.	FERRARI, I. Notes on the Dynamics of the Reproductive
Shifting Offshore Bars and Harbor Shoaling, W74-01191 2J	Gas-Liquid Chromatographic Determination of	Activity of Arctodiaptomus Bacillifer in High Altitude Alpine Lakes.
W/4-01191	Chlorpyriphos in Dursban Insecticide Formula- tions,	W74-01209 2H
DUKE, P. D.	W74-01405 5A	
Small-Volume Solid-Electrode Flow-Through		FFOLLIOTT, P. F. Development of a Time-Space Prediction
Electrochemical Cells. Preliminary Evaluation Using Pulse Polarographic Techniques,	ENNIS, G. P.	Technique to Evaluate Snowpacks in and Ad-
W74-01445 7B	Behavioral Responses to Changes in Hydro- static Pressure and Light During Larval	jacent to Forest Openings,
DUNCAN B B	Development of the Lobster Homarus Gam-	W74-01231 3B
DUNCAN, R. D. Separation of Polyphosphates by Paper Chromatography with a New Solvent,	marus, W74-01436 5C	FIERING, M. B. Simulation Models for Water-Resource
W74-01366 5A	ERIN, V. T.	Systems: Their Utility in Measuring Physical
DUTHIE, H. C.	Effect of an Increased Water Rate in Liquid	and Economic Effects of Weather Forecasting and Weather Modification: Summary Report,
Diatom Flora of the Grand River, Ontario,	Dressing on Sugar Beet Yield, (In Russian), W74-01211 3F	W74-01463 3B
Canada, W74-01311 5A		FISCHL, M.
W74-01311 5A	ESCOVAR, G.	A Systematic Study of the Variables Involved
DUTKA, B. J.	Physical Properties of Some Volcanic-Ash Derived Soils of the Highlands of Pasto,	in the Reverse-Phase Thin-Layer Chromatog-
Studies of Rapid NTA-Utilizing Bacterial Mu-	Narino, Colombia, (In Spanish),	raphy of Oxyethylated Alkyl Sulfate Surfac-
tant, W74-01348 5B	W74-01228 2G	tants, W74-01358 5A
	EVANS, D. D.	
DUTTA, B. K. The Characteristics of the Raw Waters of	Educational Programs for Land and Water	FISHMAN, M. J.
Hasdeo River and Dhengur Nala at Korba (M.	Resources Development and Management,	Evaluation of the Use of the Heated Graphite Atomizer for the Routine Determination of
P.),	W74-01628 6B	Trace Metals in Water,
W74-01240 5A	Transient Movement of Water and Solutes in	W74-01316 5A
DUXBURY, A. C.	Unsaturated Soil Systems,	FLANIGAN, L. K.
Tidal Period Oscillations of an Isohaline Sur-	W74-01104 2G	Relationships of Indicator and Pathogenic Bac-
face Off the Mouth of the Columbia River,	EVERETT, L. G.	teria in Stream Waters,
W74-01188 2L	A Mathematical Model of Primary Productivity	W74-01645 5B
The Union of the Columbia River and the	and Limnological Patterns in Lake Mead,	FLOODGATE, G. D.
Pacific Ocean General Features,	W74-01630 5C	The Effect of Microbial Activity Upon the
W74-01183 2L	EYRE, L. A.	Sedimentary Sulphur Cycle, W74-01239 5B
DUXBURY, J. M.	Tidewater Shorelines in Broward and Palm	
2,4-dichlorophenoxyacetate metabolism by	Beach Counties, Florida: An Analysis of Characteristics and Changes Interpreted from	FOCHT, D. D.
Arthrobacter sp.: Accumulation of a Chlorobu- tenolide,	Color, Color Infrared and Thermal Aerial	Isotope Fractionation of N-15 and N-14 in Microbiological Nitrogen Transformations: A
W74-01550 5B	Imagery,	Theoretical Model,
	W74-01220 2L	W74-01541 5B
DYKYJOVA, D. Growth Rate and Development of the	FAHY, E.	FOHN, P. M. B.
Root/Shoot Ratio in Reedswanp Macrophytes	An Automatic Separator for the Removal of	Short-Term Snow Melt and Ablation Derived
Grown in Winter Hydroponic Cultures,	Aquatic Insects from Detritus,	from Heat- and Mass-Balance Measurements,
W74-01346 2I	W74-01624 7B	W74-01380 2C

GILLIES, N. E.

2L

Some Influences of Aquatic Vegetation on the The Sensitivity of Suppressed and Unsup-

FURLOW, B. M.

Concentrations of Plutonium, Cobalt, and

Silver Radionuclides in Selected Pacific Seaweeds, W74-01297	Species and Number of Culicidae (Diptera) in Small Pools of Water, W74-01609 2I	pressed Lon Strains of Escherichia coli to Chemical Agents with Induce Filamentation, W74-01524 5C
PORCHAN A		
FORSMAN, A. Development of A Conceptual Deterministic Rainfall-Runoff Model,	GABRILEVSKAYA, L. N. Barrier Role of Water Works Installations in	GLEASON, G. I. Distribution Studies of Radium and Other
W74-01128 2A	Respect to Chemical Contaminations Classified	Metallic Elements Between Thenoyl-
	According to Organoleptic Properties of Hazards, (In Russian),	trifluoroacetone in Methyl Isobutyl Ketone and Aqueous Solutions,
FOSTER, J. H.	W74-01584 5D	W74-01494 5A
Valuation of Visual-Cultural Benefits from		
Freshwater Wetlands in Massachusetts, W74-01643 6B	GALVIN, C. J. JR	GLEDHILL, W. E.
W/ 101010	Longshore Current Velocity: A Review of	Biodegradation of O-Benzyl-P-Chlorophenol,
FOX, J. L.	Theory and Data,	W74-01552 5B
Nutrient Removal Using Lemna Minor,	W74-01187 2E	GLINSKI, J.
W74-01321 5C	GANCZARCZYK, J.	Occurrence and Cumulation of Microcom-
FOX, M. E.	Fate of Lignin in Kraft Effluent Treatment,	ponents in Bottom Sediments of Dam Reser-
Rapid Gas Chromatographic Method for Deter-	W74-01320 5B	voirs of Southern Poland,
mination of Residual Methanol in Sewage,		W74-01565 5B
W74-01410 5A	GANJINI, A.	
POV W T	Soil and Water Conservation on Arable Lands,	GLOOSECHENKO, W. A.
FOX, W. T. Coastal Processes and Beach Dynamics at	W74-01633 3F	Changes in Species Composition of
Sheboygan, Wisconsin, July, 1972,	GARD, R.	Phytoplankton Due to Enrichment by N, P, and Si of Water From a North Florida Lake,
W74-01130 2H	Persistence of Headwater Check Dams in a	W74-01503 5C
	Trout Stream,	
A Profile of the Four Moment Measures Per-	W74-01566 2I	GOLUB, H.
pendicular to a Shore Line, South Haven,		Heavy Metals in Wastewater and Treatment
Michigan, W74-01184 2H	GAREWAL, H. S.	Plant Effluents,
W/4-01164 2H	A Procedure for the Estimation of Microgram	W74-01319 5A
FRAAS, L. M.	Quantities of Triton X-100,	GOLUBEV, G. N.
Novel Method of Raman Data Acquisition,	W74-01360 5A	Problems in Hydrology of Glaciers and
W74-01330 2K	GARMASHOV, V. N.	Glacierized Areas (Problemy gidrologii led-
FRANCISCO, D. E.	Two Harvest of Cereal Crops per Year with Ir-	nikov i lednikovykh rayonov),
Acridine Orange-Epifluorescence Technique	rigation, (In Russian),	W74-01132 2C
for Counting Bacteria in Natural Waters,	W74-01202 3F	GOODRIDGE, J. D.
W74-01534 5A	CATIMATER I E	Climatological Stations in California, 1971,
PRAINTONY I D	GAUMNITZ, J. E. Simulation of Water Recreation Users' Deci-	W74-01383 7C
FRAUTSCHY, J. D. Littoral Processes and the Development of	sions.	W/4-01303
Shorelines,	W74-01464 6D	GORBUSHINA, L. V.
W74-01212 2J	-	Isotopic Composition of Oxygen and Hydrogen
	GEMMELL, R. S.	in Sulfide Waters of the Sochi-Adler Artesian
FREEMAN, C. A. Longitudinal Distribution and Habitat of the	Water Quality Evaluation of Regionalized	Basin (Izotopnyy sostav kisloroda i vodorada
Fishes of Mason Creek, an Upper Roanoke	Wastewater Systems, W74-01107 5D	sul'fidnykh vod Sochi-Adlerskogo artezian-
River Drainage Tributary, Virginia,	W74-01107 5D	skogo basseyna), W74-01394 2K
W74-01592 2I	GERRARD, D. L.	117-01374 ZK
	Simple Direct Combination of Gas Chromatog-	GOSZ, J. R.
FREEMAN, C. E.	raphy and Vapor Phase Infrared Spectrometry,	Hydrologic Nutrient Cycle Interactions in
Germination Responses of a Texas Population of Ocotillo (Fouquieria splendens Engelm.) To	W74-01355 5A	Undisturbed and Manipulated Ecosystems
Constant Temperature, Water Stress, pH and	GEUZE, E. C. W. A.	(Watersheds), W74-01110 4C
Salinity,	Investigations on the Sheathed Bacterium	W74-01110 4C
W74-01591 2I	Haliscomenobacter hydrossis Gen.n., Sp.n.,	GOTO, M.
EDEL D.W	Isolated from Activated Sludge,	Semiintegral Electroanalysis: Shapes of
FREI, R. W. The Determination of Organo-Sulfur Com-	W74-01539 5B	Neopolarograms,
pounds by Thin-Layer Chromatography Via a		W74-01333 5A
Ligand-Exchange Precess,	GHILDYAL, B. P. Effect of Puddling on Physical Properties of	GRABHAM, A. L.
W74-01439 5A	Rice Soil.	Harbor Analog System, Part I - Waves,
PRIPAMAN P	W74-01246 3F	W74-01200 2L
FRIEDMAN, R. Computer Identification of Bacteria on the		21
Basis of Their Antibiotic Susceptibility Pat-	GIKIC, M.	GRANT, D. J. W.
terns,	The Influence of Some Climatic Factors on the	Degradative Versatility of Corynebacterium
W74-01443 5A	Productivity of Red Clover Seed, (In Serbo-	pseudodiphtheriticum NCIB 10803 which uses
FROMM P.O.	Croatian), W74-01556 3F	Amides as Carbon Source, W74-01536 SR
FROMM, P. O. Uptake of Methyl Mercuric Chloride and Mer-	W74-01556 3F	W74-01536 5B
curic Chloride by Trout: A Study of Uptake	GILBERT, T. W.	GRAY, I. E.
Pathways into the Whole Animal and Uptake	New Detector for Ion-Exchange Chromatog-	The Circulation of Surface Waters in Raleigh
by Erythrocytes in Vitro,	raphy,	Bay, North Carolina,
W74-01412 5C	W74-01343 5A	W74-01210 2L

GRAY, J. S. Growth Rates of Sediment-Living Marine Protozoan as a Toxicity Indicator for Heavy	GUERREO R, RICARDO Physical Properties of Some Volcanic-Ash Derived Soils of the Highlands of Pasto,	HARADA, H. M. JR A Modified Filtration Method for the Analysis of Wastewater Suspended Solids,
Metals, W74-01529 5A	Narino, Colombia, (In Spanish), W74-01228 2G	W74-01318 5A
GRAY, O. N.	CUCCINO W P	HARDY, J. T.
Glass-Metal Composite Electrodes,	GUGGINO, W. B.	Spectral Absorption of Solar Radiation in Al-
W74-01512 2K	Heavy Metals in Wastewater and Treatment	pine Snowfields,
W/4-01312	Plant Effluents,	W74-01626 2C
GREAVES, J. R.	W74-01319 5A	HARDY, L. H.
Marine Resources and Ocean Surveys,	GUILBAULT, G. G.	Relation Between Total Body Weight and Con-
W74-01169 7B	Glass-Metal Composite Electrodes,	centrations of Manganese, Iron, Copper, Zinc,
	W74-01512 2K	and Mercury in White Muscle of Bluefish (Po-
GREEN, R. H.	W/4-01312	
Distribution and Morphological Variation of	GUILLARD, R. R. L.	matomus saltatrix) and A Bathyl-Dimersal Fish
Lampsilis radiata (Pelecypoda, Unionidae) in	Kinetics of Silicon-Limited Growth in the	Antimora Rostrata, W74-01413 5B
Some Central Canadian Lakes: A Multivariate	Marine Diatom Thalassiosira pseudonana Hasle	W74-01413 5B
Statistical Approach,	and Heimdal (Equals Cyclotella Nana Hustedt),	HARE, C. R.
W74-01608 2H	W74-01431 5C	Chemical Relationships Between Surface
GREEN, V. E.		Water and the Ground in South Florida,
Practical Methods for Derivatizing and Analyz-	GUPTA, T. R.	W74-01153 2K
ing Bacterial Metabolites with a Modified Auto-	Valuation of Visual-Cultural Benefits from	W 74-01133
matic Injector and Gas Chromatograph,	Freshwater Wetlands in Massachusetts,	HARGRAVE, B. T.
W74-01336 5A	W74-01643 6B	Coupling Carbon Flow Through Some Pelagic
111111111111111111111111111111111111111		and Benthic Communities,
GREENFIELD, L. J.	HAAN, H. DE.	W74-01437 5B
Chemical Relationships Between Surface	Molecule-Size Distribution of Soluble Humic	
Water and the Ground in South Florida,	Compounds From Different Natural Waters,	HARKNESS, A. M.
W74-01153 2K	W74-01351 2H	Practical Methods for Derivatizing and Analyz-
		ing Bacterial Metabolites with a Modified Auto-
GREENSPAN, H. P.	HAFEEZ KHAN, M. A.	matic Injector and Gas Chromatograph.
A Note on Edge Waves in a Stratified Fluid,	Irrigation Waters of the Indus Plains and Their	W74-01336 5A
W74-01194 2E	Salt Load,	
CRIPS I P	W74-01639 3C	HARPER, P. P.
GRIES, J. P.		Emergence, Reproduction, and Growth of
Calculation of Permeability of Cretaceous	HAGAN, R. M.	Setipalpian Plecoptera in Southern Ontario,
Sandstones from Pumping and Static Level	Potential Usefulness of Antitranspirants for	W74-01359 5A
Data in Selected Areas of Western South	Solution of Some Water Supply, Plant Growth,	
Dakota, W74-01113 2F	and Environmental Problems,	HARRIS, L. D.
W /4-01113 2F	W74-01105 3B	Areas of Possible Flooding in Knox County,
Determination of the Total Storage Capacity of		Tennessee,
the Cretaceous Sandstone Aquifers in South	HALES, D. C.	W74-01269 7C
Dakota,	Nutrient Sources and Transport in the Upper	
W74-01114 2F	and Central Regions of the Big Sioux River,	Areas with Abundant Sinkholes in Knox Coun-
	W74-01115 5B	ty, Tennessee,
GRIFFITHS, D.	HANGOCK P. D.	W74-01270 7C
The Structure of an Acid Moorland Pond Com-	HANCOCK, F. D.	Cotamories of Relative Esseibility for Contin
munity,	The Ecology of the Diatoms of the Klip River,	Categories of Relative Feasibility for Septic-
W74-01508 5C	Southern Transvaal, W74-01313 5C	Tank Filter Fields in Knox County, Tennessee,
CDICCE I H	W74-01313 5C	W74-01145 7C
GRIGGS, J. H. Emission Spectrometric Determination of	HANKS, A. R.	Engineering Characteristics of Overburden in
Emission Spectrometric Determination of Trace Metals in Biological Tissues,	Gas-Liquid Chromatographic Determination of	Knox County, Tennessee,
	Chlorpyriphos in Dursban Insecticide Formula-	W74-01143 7C
W74-01546 5A	tions,	7. Total
GRIP, H.	W74-01405 5A	Overburden Related to Type of Bedrock and
A Deterministic Parametric Water-Balance	34	Engineering Characteristics of the Bedrock.
Model,	HANSEN, D. V.	Knox County, Tennessee,
W74-01126 2A	Estuarine Circulation Induced by Diffusion,	W74-01144 7C
	W74-01222 2L	,,
GRODZINSKI, B.		HARVEY, R. M.
Loss of Photosynthetic Activity in Two Blue-	HANSEN, E.	Nutrient Removal Using Lemna Minor,
Green Algae as a Result of Osmotic Stress,	Numerical Simulation of the Rainfall-Runoff	W74-01321 5C
W74-01302 5B	Process on a Daily Basis,	
GROOVER, R. D.	W74-01127 2A	HASAN, S. B.
Electrophoretic and Immunological Analyses of		Irrigation Waters of the Indus Plains and Their
Seven Chlorosarcinacean Algae.	HANSEN, T. A.	Salt Load,
W74-01426 5A	Rhodopseudomonas Sulfidophila, Nov. Spec.,	W74-01639 3C
JA.	A New Species of the Purple Nonsulfur Bac-	TI A CONTRACTOR THE TE
GROVE, G.	teria,	HASTINGS, W. H.
Storage and Retrieval of Groundwater Data,	W74-01544 5B	Monitoring Channel Catfish Use of a Demand
W74-01291 7C	HANCEON I	Feeder,
	HANSSON, I.	W74-01237 8I
GUARNERI, C. A.	Evaluation of the Accuracy of Gran Plots by	HARCEN D B
Study of Water Recovery and Solid Waste	Means of Computer Calculations. Application	HAUGEN, D. P.
Processing for Aerospace and Domestic Appli-	to the Potentiometric Titration of the Total Al-	The Arctic Data Buoy, A System for Environ- mental Monitoring in the Arctic.
cations: Volume 1 - Final Report Summary,	kalinity and Carbonate Content in Sea Water, W74-01365	
W74-01280 5D	W74-01365 2K	W74-01158 7B

AUTHOR INDEX

HAWKES, D. D.

HAWKES, D. D.	HOEHN, R. C.	HOWARD, H. H.
Erosion of Tidal Flats Near Georgetown,	Sensitivity of Three Selected Bacterial Species	Seasonal Variation of Chemical Parameters in
British Guiana, W74-01216 2J	to Ozone, W74-01553 5F	Alaskan Tundra Lakes, W74-01347 5B
W/4-01210	-	
HAWKRIDGE, F. M.	HOELL, K.	HOWEIER, R. H.
Indirect Coulometric Titration of Biological	Water. Examination. Assessment. Condition-	The Oxygen Status of Lake Sediments, W74-01266 2J
Electron Transport Components,	ing. Chemistry. Bacteriology. Biology,	W74-01266 2J
W74-01338 2K	W74-01236 5F	HOYT, J. H.
HAVE V I	HOFFMAN, I.	Sedimentation in a Meandering Estuary,
HAYS, K. L.	Determination of Meleic Hydrazide Residues in	W74-01177 2L
Some Influences of Aquatic Vegetation on the Species and Number of Culicidae (Diptera) in	Tobacco and Vegetables,	
Small Pools of Water,	W74-01418 5A	HRADECKA, D.
W74-01609 2I	W 14-01410	Growth Rate and Development of the
W/4-01009	HOGG, N. G.	Root/Shoot Ratio in Reedswanp Macrophytes
HEIFETZ, S. B.	Longshore Current Generation by Obliquely In-	Grown in Winter Hydroponic Cultures,
Effect of Partial Defluoridation of a Water	cident Internal Waves,	W74-01346 2I
Supply on Dental Fluorosis: Final Results in	W74-01650 2E	HUBNER, F. N.
Bartlett, Texas, After 17 Years,		Gas-Solid Chromatography on Macroreticular
W74-01578 5F	HOGGINS, F. E.	Cation Exchange Resins,
	Natural Dispersion of Mercury from Puhipuhi,	W74-01495 5A
HERBEL, C. H.	Northland, New Zealand,	
Brush Eradicating, Basin Pitting, and Seeding	W74-01307 5B	HUFSCHMIDT, M. M.
Machine for Arid to Semiarid Rangeland,	HOJDA, K.	And Not a Drop to Drink: Water Resources
W74-01637 4A	Diatoms of the Upper Course of the Stream	Planning and Administration, W74-01465 6E
HERNDON, A.	Sanka (Cracow-Czestochowa Upland), (In	W74-01465 6E
Comparison of Gage and Radar Methods of	Polish),	Promoting Environmental Quality Through
Convective Precipitation Measurement,	W74-01258 2I	Urban Planning and Controls,
W74-01149 2B	-	W74-01470 5D
	HOLDSWORTH, G.	
HERR, R. L.	Ice Calving into the Proglacial Generator Lake,	River Basin Planning in the United States,
Storage and Retrieval of Groundwater Data,	Baffin Island, N.W.T., Canada,	W74-01472 6B
W74-01291 7C	W74-01376 2C	The Role of Universities in Water Resources
	MOLE AND IN TH	Education: The Social Sciences,
HETESA, J.	HOLLAND, W. H.	W74-01467 6B
Hydrobiological Studies on the Lednicke Ryb-	Versatile Computer Generated Variable Ac-	W 77 01707
niky Ponds: Species Composition and Seasonal	celerating Voltage Circuit for Magnetically	Simulating the Behavior of a Multi-Unit, Multi-
Variation in the Abundance of Plankton (In	Scanned Mass Spectrometers. Use for Assays	Purpose Water-Resource System,
Czech),	in the Picogram Range and for Assays of Stable	W74-01468 6A
W74-01567 5C	Isotope Tracers, W74-01335 2K	Cimulation Madela for Water Barrense
HETLING, L. J.	11 7 01333	Simulation Models for Water-Resource Systems: Their Utility in Measuring Physical
A Study of Tidal Dispersion in the Potomac	HOLM, H. W.	and Economic Effects of Weather Forecasting
River,	Effects of Protozoa on the Fate of Particulate	and Weather Modification: Summary Report,
W74-01196 5B	Carbon,	W74-01463 3B
	W74-01117 5C	
HILL, H. M.		HUME, J. D.
Physical System Modelling as a Tool in Water	HOLMES, W. F.	Shoreline Processes Near Barrow, Alaska: A
Resource Planning,	Versatile Computer Generated Variable Ac-	Comparison of the Normal and the
W74-01487 2A	celerating Voltage Circuit for Magnetically	Catastrophic,
MINIMALAN C. D.	Scanned Mass Spectrometers. Use for Assays	W74-01193 2L
HINDMAN, G. D.	in the Picogram Range and for Assays of Stable	HURR, R. T.
The Determination of Cadmium by Atomic Ab-	Isotope Tracers,	Hydrogeologic Characteristics of the Valley-
sorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer,	W74-01335 2K	Fill Aquifer in the Weldona Reach of the South
W74-01441 5A	HOMMA, A.	Platte River Valley, Colorado,
W/4-01441	Virus Concentration from Sewage,	W74-01142 4B
HINSON, B.	W74-01533 SD	
Monitoring Channel Catfish Use of a Demand		HYATT, R. A.
Feeder,	HOPKINS, H. P. JR	Supersaturation of Nitrogen in Water During
W74-01237 8I	Thermodynamics of Acid-Base Equilibria. II.	Passage Through Hydroelectric Turbines at Mactaquac Dam,
	Ionization of m- and p-Hydrox-	W74-01432 5C
HIRSCH, R. F.	ybenzotrifluoride and the Concept of Fluorine	W/4-01-02
Gas-Solid Chromatography on Macroreticular	Double Bond-No Bond Resonance,	ICHIYE, T.
Cation Exchange Resins, W74-01495 5A	W74-01226 2K	Edge Waves Over a Sloping Beach in a Rotat-
W74-01495 5A	HORN, M. H.	ing Two-Layered System,
HO, D. V.	The Amount of Space Available for Marine and	W74-01218 2E
Long Surf.	Freshwater Fishes,	Experiments and Hydrographic Surveys Off
W74-01203 2E	W74-01561 2I	Sandy Hook, New Jersey (1963).
25		W74-01199 2L
HODGE, V. F.	HOROWITZ, H. S.	
Concentrations of Plutonium, Cobalt, and	Effect of Partial Defluoridation of a Water	IIDA, H.
Silver Radionuclides in Selected Pacific	Supply on Dental Fluorosis: Final Results in	Edge Waves Over a Sloping Beach in a Rotat
Seawceds,	Bartlett, Texas, After 17 Years,	ing Two-Layered System,
W74-01297	W74-01578 5F	W74-01218 2E

2E

IKAN, R.	JAMES, R.	matomus saltatrix) and A Bathyl-Dimersal Fish
C 18-Isoprenoid Ketone in Recent Marine Sedi-	The Sensitivity of Suppressed and Unsup-	Antimora Rostrata,
ment,	pressed Lon Strains of Escherichia coli to	W74-01413 5B
W74-01301 5A	Chemical Agents with Induce Filamentation, W74-01524 5C	JURADO, R.
IMLAY, M. J.		Physical Properties of Some Volcanic-Ash
Greater Adaptability of Freshwater Mussels to	JAN, NISAR A.	Derived Soils of the Highlands of Pasto,
Natural Rather Than to Artificial Displace-	A First Record of Red-Water Phenomenon in	Narino, Colombia, (In Spanish),
ment,	Kashmir, India,	W74-01228 2G
W74-01235 8I	W74-01564 5C	TURES O
		JURIS, S.
INHAT, M.	JARROW, H. C.	Phytoplankton of the Czechoslovak Sector of
Determination of Meleic Hydrazide Residues in	Ethylenethiourea Degradation,	the Danube and of the Estuaries of the Prin-
Tobacco and Vegetables,	W74-01340 5B	cipal Tributaries on Czechoslovak Territory,
W74-01418 5A		(In Czect.),
	JEFFREY, A.	W74-01371 2I
INMAN, D. L.	The Breaking of Waves on a Sloping Beach,	
Littoral Processes and the Development of	W74-01176 2E	KAHN, E. H.
Shorelines.		A Resonant Capsule Pressure Transducer For
W74-01212 2J	JENKINS, R. E.	Data Buoys,
	Longitudinal Distribution and Habitat of the	W74-01160 7B
IOSIFOVA, YE. V.	Fishes of Mason Creek, an Upper Roanoke	
Isotopic Composition of Oxygen and Hydrogen	River Drainage Tributary, Virginia,	KAISER, E. J.
in Sulfide Waters of the Sochi-Adler Artesian	W74-01592 2I	Promoting Environmental Quality Through
		Urban Planning and Controls,
Basin (Izotopnyy sostav kisloroda i vodorada	JENNE, E. A.	W74-01470 5D
sul'fidnykh vod Sochi-Adlerskogo artezian-	Literature on Mercury: Availability of English	
skogo basseyna),	Translations,	KALININ, G. P.
W74-01394 2K	W74-01323 5A	Epidemiological and Toxicological Aspects of
TRIVING IN		Nitrates and Nitrites in the Environment,
IRWIN, B.	JENSEN, A. L.	W74-01386 5C
Phytoplankton Nutrients and Flushing of Inlets	Population Biomass, Number of Individuals,	
on the Coast of Nova Scotia,	Average Individual Weight, and the Linear Sur-	Prospects for the Use and Conservation of
W74-01471 5B	plus Production Model,	Water Resources in the USSR (Perspektivy
	W74-01593 2I	ispol'zovaniya i okhrany vodnykh resursov
ISENSEE, A. R.		SSSR),
Distribution of Alkyl Arsenicals in Model	JOHANNSSON, S.	W74-01387 6B
Ecosystem,	Reservoir Mechanism in an Aquifer of Arbitra-	
W74-01409 5C	ry Boundary Shape,	KALMYKOV, A. G.
	W74-01129 2F	Study of Soil Plasticity over a wide Range of
ITO, N.		Soil Moisture Contents,
On the Small-Scale Horizontal Diffusion Near	JOHNS, B.	W74-01636 2G
the Coast,	On the Vertical Structure of Tidal Flow in	
W74-01186 5B	River Estuaries,	KAMEL, A. M.
-	W74-01205 2L	Thermal Stratification in Industrial Canals,
IVERSON, W. P.		W74-01594 2E
Biodegradation of Phenylmercuric Acetate by	Some Consequences of an Inertia of Turbu-	
Mercury-Resistant Bacteria,	lence in a Tidal Estuary,	KAMI, H. T.
W74-01555 5B	W74-01648 2L	Algal Succession on Artificial Reefs in a
		Marine Lagoon Environment in Guam,
JACKSON, D. B.	JOHNSON, P.	W74-01429 5C
Recognition of Natural Brine by Electrical	Underground Storage of Texas Playa Lake	
Soundings Near the Salt Fork of the Brazos	Waters by Injection Into the Ogallala Forma-	KANEMASU, E. T.
River, Kent and Stonewall Counties, Texas,	tion Under Moderate Pump Pressure,	Stomatal-Diffusion Resistance and Water
W74-01370 2F	W74-01627 4B	Potential of Soybean and Sorghum Leaves,
W 14-01370 2F		W74-01605 3F
JACKSON, T. A.	JOHNSON, R. P.	
Kinetics of Silicon-Limited Growth in the	Limnology and Fishery Biology of Black Lake,	KANWAR, J. S.
Marine Diatom Thalassiosira pseudonana Hasle	Northern Saskatchewan,	Effect of the Quality of Well Waters on Soils in
and Heimdal (Equals Cyclotella Nana Hustedt),	W74-01234 2H	Gurgaon District,
		W74-01252 2G
W74-01431 5C	JONES, C. E.	
JACKSON, W. M.	Vortex Concept for Separating Oil from Water,	KAPLAN, I. R.
Distribution Studies of Radium and Other	W74-01148 5G	C 18-Isoprenoid Ketone in Recent Marine Sedi-
		ment,
the processor the control of the con	JONES, E. C.	W74-01301 5A
trifluoroacetone in Methyl Isobutyl Ketone and	New Records of Sargassum Hawaiiensis Doty	
Aqueous Solutions,	and Newhouse (Sargassaceae, Phaeophyta), a	KARADI, G. M.
W74-01494 5A	Deep Water Species,	Drawdown at Time-Dependent Flowrate,
TACNED D	W74-01349 2I	W74-01155 2F
JAGNER, D.	TOWNS OF	PAGGARY B W
Evaluation of the Accuracy of Gran Plots by	JONES, G. E.	KASSABY, F. Y.
Means of Computer Calculations. Application	Distribution of Alkyl Arsenicals in Model	Die-Back in the Mixed Hardwood Forests of
to the Potentiometric Titration of the Total Al-	Ecosystem,	Eastern Victoria: A Preliminary Report,
kalinity and Carbonate Content in Sea Water,	W74-01409 5C	W74-01251 4A
W74-01365 2K		
	JONES, N. Y.	KEARNEY, P. C.
The Potentiometric Titration of Potassium in	Relation Between Total Body Weight and Con-	Distribution of Alkyl Arsenicals in Mode
Sea Water with a Valinomycin Electrode,	centrations of Manganese, Iron, Copper, Zinc,	Ecosystem,
W74-01442 5A	and Mercury in White Muscle of Bluefish (Po-	W74-01409 50

5C

AUTHOR INDEX

KEDDINGTON, M. B.

Seasonal Water Potential Patterns in the Moun-	Effect of Spoil Disposal on Benthic Inver-	Critical Study of the APCD-MIBK Extraction
tain Brush Zone, Utah,	tebrates,	System for Atomic Absorption,
W74-01588 2I	W74-01420 5C	W74-01329 5A
KEEFER, L. K.	KIRALY, L.	KOROLEV, A. A.
N-Nitrosation by Nitrite Ion in Neutral and	Prediction of the Variation in the Chemistry of	Comparative Evaluation of the Efficacy of
Basic Medium,	a Lake Resulting from an Increase in Soluble	Ozonization and Other Means of Treating
W74-01328 5B	Deposits: Application: The Sodium in Lake Neuchatel,	Water Containinated With Oil Products (In
KEENEY, M.	W74-01562 2H	Russian),
Biochemistry of Estuarine Ecosystem with	W/4-01502 2H	W74-01580 5F
Emphasis on Heavy Metals and Shellfish,	KIRILLOVA, G. G.	PACKE B II
W74-01108 5C	Zooplankton in Kolyma-Indigirka Lakes (In	KOSKE, P. H.
KELLBERG, J. M.	Russian),	Investigations on the Influence of Tides of
Engineering Characteristics of Overburden in	W74-01341 2H	Salinity, Content of Suspended Matter, Sedi
Knox County, Tennessee,	TIRRICH IN C	mentation and Bacteria Counts in the Elbe
W74-01143 7C	KIRPICHNIKOV, V. S. Increase of Resistance of Carp to Dropsy by	Estuary, (Untersuchungen Uber Die Einwir
	Means of Breeding. II. Course of Selection and	kung Der Tide Auf Salzgehalt, Schwebstoff
Overburden Related to Type of Bedrock and	Evaluation of the Breed Groups, (In Russian),	gehalt, Sedimentation Und Bakteriengehalt in Der untereibe).
Engineering Characteristics of the Bedrock,	W74-01560 5C	W74-01175 2I
Knox County, Tennessee,		W 74-01175 21
W74-01144 7C	KISIEL, C. C.	KOTLYAKOV, V. M.
KENT, D. C.	A Stochastic Model of Streamflow Based on	Problems in Hydrology of Glaciers and
Sensitivity of Groundwater flow Models to	the Theory of Functions of Markov Processes,	Glacierized Areas (Problemy gidrologii led
Vertical Variability of Aquifer Constants,	W74-01123 2E	nikov i lednikovykh rayonov),
W74-01151 4B	WILDLIN C. D.	W74-01132 20
	KJARAN, S. P.	
KERR, S. R.	Reservoir Mechanism in an Aquifer of Arbitra-	KOTOV, M. I.
Variation of Organochlorine Residue Levels	ry Boundary Shape, W74-01129 2F	Effect of the Desna River Flood on Develop
with Age in Gulf of St. Lawrence Harp Seals	W/4-01129 2F	ment of Vegetation and Flora of the Oster Out
(Pagophilus Groenlandicus), W74-01300 5A	KLEMMACK, D. L.	skirts (Ukranian)
W74-01300 3A	Concept-Scale Interaction with the Semantic	W74-01362 2
KERUT, E. G.	Differential Technique,	
The Arctic Data Buoy, A System for Environ-	W74-01644 6B	KOWALSKI, W.
mental Monitoring in the Arctic,		Batrachospermum Vagum Ag. in the Szczecia
W74-01158 7B	KLIKOFF, L. G.	Pomerania, A Locality New to Poland, (In
PERSONAL PROPERTY.	Carbon Dioxide Exchange by Several Stream-	Polish),
KHAN, R. A.	Side and Scrub Oak Community Species of Red	W74-01219 2F
Water Requirements of Wheat and Cotton on a High Water Table Soil Under Arid Conditions,	Butte Canyon, Utah, W74-01590 21	KOWBLANSKY, M.
W74-01595 3F	W 74-01390 21	Gas-Solid Chromatography on Macroreticula
	Seasonal Water Potential Patterns in the Moun-	Cation Exchange Resins,
KHANNA, P. K.	tain Brush Zone, Utah,	W74-01495 5A
Desorption and Dissolution of Salts from Soils	W74-01588 2I	1177-0175
as a Function of Soil Water Ratio,		KRAPOHL, R. F.
W74-01604 2G	KLIMENKO, V. I.	Wave-Induced Water Particle Motion Measure
KHIYAMA, H. M.	Balance Estimate of Groundwater Resources	ments,
Sand Beach Bacteria: Enumeration and	on the Northwestern Slope of the Caucasus	W74-01285 21
Characterization,	(Balansovaya otsenka resursov podzemnykh vod severo-zapadnogo sklona Bol'shogo Kav-	
W74-01444 5A	kaza),	KRIGMAN, A.
	W74-01136 4B	Guide to Selecting Graphic Displays,
KHODAKOV, V. G.	***************************************	W74-01519 71
Problems in Hydrology of Glaciers and	KLIMOWICZ, H.	
Glacierized Areas (Problemy gidrologii led-	Microfauna of Activated Sludge. Part III. The	KRIVOKOBYL'SKII, I. M.
nikov i lednikovykh rayonov), W74-01132 2C	Effect of Physico-Chemical Factors on the Oc-	Experimental Establishment of Forest Planta
W/4-01132 2C	currence of Microfauna in the Annual Cycle,	tions on Sands, in Accordance with the Idea o
KILGORE, W. W.	W74-01542 5C	G. N. Vysotskii (In Russian),
Thermal and Base-Catalyzed Hydrolysis	KNISELEY, R. N.	W74-01569
Products of the Systemic Fungicide, Benomyl,	Lateral Diffusion Interferences in Flame	KRIIMM H.
W74-01504 5B	Atomic Absorption and Emission Spec-	Investigations on the Influence of Tides of
KILHAM, P.	trometry,	Salinity, Content of Suspended Matter, Sedi
Kinetics of Silicon-Limited Growth in the	W74-01342 2K	mentation and Bacteria Counts in the Elb
Marine Diatom Thalassiosira pseudonana Hasle	WOOMPENON A N	Estuary, (Untersuchungen Uber Die Einwis
and Heimdal (Equals Cyclotella Nana Hustedt),	KOCHETKOVA, S. N.	kung Der Tide Auf Salzgehalt, Schwebstoff
W74-01431 5C	Use of Isotopic Methods to Determine Present	gehalt, Sedimentation Und Bakteriengehalt i
VING B W	Rates of Snow Accumulation in Antarctica	Der unterelbe),
KING, P. H.	(Ispol'zovaniye izotopnykh metodov dlya opredeleniya sovremennoy skorsti nakopleniya	W74-01175 21
Sensitivity of Three Selected Bacterial Species	snega v Antarktide),	
to Ozone, W74-01553 5F	W74-01393 2C	KUBLER, B.
# /************************************		Prediction of the Variation in the Chemistry of
KING, S. S.	KOERNER, R. M.	a Lake Resulting from an Increase in Solubl
Application of Infrared Fourier Transform	The Mass Balance of the Sea Ice of the Arctic	Deposits: Application: The Sodium in Lak
Spectroscopy to Analysis of Micro Samples,	Ocean,	Neuchatel,
W74-01303 2K	W74-01374 2C	W74-01562 21

2H

KULAKOV, A. P. Quaternary Shorelines of the Seas of Okhotsk and Japan (Chetvertichnyye beregovyye linii Okhotskogo i Yaponskogo morey),	Barrier Role of Water Works Installations in Respect to Chemical Contaminations Classified According to Organoleptic Properties of	LEPPLE, F. K. Mercury in the EnvironmentA Global Review Including Recent Studies in the Delaware Bay Region,
W74-01391 2J	Hazards, (In Russian), W74-01584 5D	W74-01373 5E
KUMAR, T. K.		LEUNG, S.
Crop Rotation Schemes for Optimal Utilization of Agricultural Land,	LATORELLA, A. H. Salinity Adaptation by Dunaliella Tertiolecta. I.	Some Observations on Bacterial Populations in Wilgreen Lake, Madison, KY.,
W74-01596 3F	Increases in Carbonic Anhydrase Activity and	W74-01242 5E
KUPRIYANOV, V. V. Urbanization and Its Effects on Regimen and	Evidence for a Light-Dependent Na (Plus)/H (Plus) Exchange,	LEWIN, V. H.
Quality of Surface Waters (Urbanizatsiya i yeye vliyaniye na rezhim i kachestvo poverkh-	W74-01427 5C	Automatic Samplers for Sewage and Effluents, W74-01306
nostnykh vod),	LATTEN, A.	11.1.6
W74-01139 4C	Automatic Samplers for Sewage and Effluents, W74-01306 5A	LI, J. C. Computer Utilization of Hydrological Data fo
KUWANA, T.	LAWSON, D. W.	North Nashwaaksis Representative Basin, W74-01294
Indirect Coulometric Titration of Biological	A Distributed Hydrological Model Based on the	WITTER
Electron Transport Components, W74-01338 2K	Concept of Groundwater Recharge, Transmis- sion, and Discharge,	LIDDLE, J. A. Modified Delves Cup Atomic Absorption
KUZ'MENKO, M. I.	W74-01233 2F	Determination of Lead in Blood,
Role of Silt in Microcystis Aeruginosa	TAWOON P N	W74-01415 5/
Development, (In Russian), W74-01368 5C	LAWSON, E. N. A Waterborne Actinomycete Resembling	LINACRE, E. T.
W74-01368 5C	Strains Causing Mycetoma,	Leaf Temperatures, Diffusion Resistances, and
LADD, J. W.	W74-01256 5B	Transpiration,
A Profile of the Four Moment Measures Per-	LE MEHAUTE, B.	W74-01254 2I
pendicular to a Shore Line, South Haven, Michigan,	Note on the Equations of Long Waves Over an	LINDEBORG, K. H.
W74-01184 2H	Uneven Bottom,	Relationship of Pumping Lift to Economic Use
	W74-01189 2E	of Groundwater for Irrigation,
LAGUEUX, R.	LEATHEM, W.	W74-01120 4I
The Planktonic Association (Cladocera and Copepoda) of a Dimictic Lake of the Lau-	Effect of Spoil Disposal on Benthic Inver-	TIMEPIT C C
rentides Park, Quebec, (In French),	tebrates,	LINDELL, S. S. Shigella Sonnei Isolated from Well Water,
W74-01558 2H	W74-01420 5C	W74-01551 5A
LAI, R. Y.	LEATHERLAND, T. M.	
Drawdown at Time-Dependent Flowrate,	Concentrations of Some Trace Metals in	LINDORF, M. R.
W74-01155 2F	Pelagic Organisms and of Mercury in Northeast Atlantic Ocean Water,	Computer Simulation of Estuarial Networks, W74-01197
LALYKIN, N. V.	W74-01523 5C	LINK, L. E.
Division of the United States into Regions Ac-		Utilization of Remote Sensing in River Basin
cording to Cophasal Fluctuations of Annual Runoff (Rayonirovaniye territorii SShA po sin-	LEAVITT, R. A. Analytical Methodology for Bioactive Com-	Studies,
faznosti kolebaniy godovogo stoka rek),	pounds. Photochemically Assisted Analysis of	W74-01154 5/
W74-01140 2E	Chlorinated Hydrocarbon Pesticides in the	LINSTEDT, K. D.
LANCTOT, L. R.	Presence of Polychlorinated Biphenyls,	A Modified Filtration Method for the Analysi
Marine Pollution: A Critique of Present and	W74-01493 5A	of Wastewater Suspended Solids,
Proposed International Agreements and Institu-	LECKMAN, J.	W74-01318 5A
tionsA Suggested Global Oceans' Environ-	Pressurized Sewer Collection Systems,	LIOTTA, C. L.
mental Regime, W74-01449 5G	W74-01286 5D	Thermodynamics of Acid-Base Equilibria. Il
	LEE, G. F.	Ionization of m- and p-Hydrox
LAND, L. S.	Leaves as Source of Phosphorus,	ybenzotrifluoride and the Concept of Fluorin
Sedimentation in a Meandering Estuary, W74-01177 2L	W74-01407 5B	Double Bond-No Bond Resonance, W74-01226 21
LANDE, A.	LEE, M-L.	LIU. D.
'Trapped Sea-Water' in Rorholtfjorden,	Soluble Aluminum in Marine and Fresh Water	Mechanism of NTA Degradation By a Bacteria
W74-01263 2K	by Gas-Liquid Chromatography, W74-01446 5A	Mutant,
LANDRIGAN, P. J.		W74-01515 51
Modified Delves Cup Atomic Absorption	LEEDEN, F. VAN DER	Studies of Banid NTA Heilining Bastorial Mu
Determination of Lead in Blood,	Regional Water Resources Studies A Spanish Experience.	Studies of Rapid NTA-Utilizing Bacterial Mu tant,
W74-01415 5A	W74-01622 4B	W74-01348 51
LANGFORD, C. H.		
Ligand Photooxidation in Copper (II) Com-	LEES, J. C. Soil Aeration Response to Draining Intensity in	LLENADO, R. A. Ion-Electrode Based Automatic Glucose Analy
plexes of Nitrilotriacetic Acid. Implications for Natural Waters.	Basin Peat.	sis System,
W74-01400 5B	W74-01255 2G	W74-01513 54
-		
LAROSE, R. H. Herbicide Analysis: Relationship Between	LELAND, H. V. Chlorinated Hydrocarbon Insecticides in Sedi-	LLEWELLYN, G. C. Evaluation of the Response of Dugesia Tigrin
Molecular Structure and Retention Index,	ments of Southern Lake Michigan,	to Aflatoxin B1,
W74-01416 5A	W74-01397 5B	W74-01404 5

5C

LOACH, K.	MACLOWRY, J.	MARA, D. D.
Effects of Shading and of Seasonal Differences	Computer Identification of Bacteria on the	Pankhurst Tubes Modified to Indicate
in Weathering on the Growth, Sugar Content	Basis of Their Antibiotic Susceptibility Pat-	Anaerobiosis,
and Sugar Yield of Sugar Beet Crops,	terns,	W74-01545 5A
W74-01229 3F	W74-01443 5A	
W/4-01227	.,,,,,,,,,	MARKHAM, J. W.
LOMBARDO, J. B.	MACNEIL, J. D.	Observations on the Ecology of Laminaria Sin
Improved Distillation Method for Volatile	The Determination of Organo-Sulfur Com-	clairii on Three Northern Oregon Beaches,
Acids Analysis,	pounds by Thin-Layer Chromatography Via a	W74-01423 50
W74-01322 5A	Ligand-Exchange Precess,	
W/4-01322	W74-01439 5A	MARKLAND, E.
LOSOS, B.		Flow Visualization in Free Shear Layers,
Hydrobiological Studies on the Lednicke Ryb-	MACRAE, I. C.	W74-01271 81
niky Ponds: Species Composition and Seasonal	Adsorption of Colloidal Iron by Bacteria,	
	W74-01253 5B	MARKS, G. C.
Variation in the Abundance of Plankton (In		Die-Back in the Mixed Hardwood Forests o
Czech),	MADDAMS, W. F.	Eastern Victoria: A Preliminary Report,
W74-01567 5C	Simple Direct Combination of Gas Chromatog-	W74-01251 4/
	raphy and Vapor Phase Infrared Spectrometry,	
LOW, M. J. D.	W74-01355 5A	MARTIN, J. E.
Quantitative Analysis of Aqueous	11.14 01333	Solvent Extraction of Metal 1,10
Nitrite/Nitrate Solutions by Infrared Internal	MADDOCK, T. JR	Phenanthroline Complexes and Concentratio
Reflectance Spectrometry,	A Role of Sediment Transport in Alluvial Chan-	of Trace Amounts of Metal Ions Prior to Spec
W74-01402 2K	nels.	trophotometric or Flame Photometric Deter
	W74-01272 2J	mination.
LOWRY, P. D.	W/4-012/2	W74-01354 5/
The Shipowner and Oil Pollution Liability,	MAH, R. A.	
W74-01447 5G	Acridine Orange-Epifluorescence Technique	MARTIN, M. K.
		A Profile of the Four Moment Measures Per
LUBRANO, G. J.	for Counting Bacteria in Natural Waters, W74-01534 5A	pendicular to a Shore Line, South Haven
Glass-Metal Composite Electrodes,	W74-01534 5A	Michigan.
The state of the s	манмоор, к.	W74-01184 2I
W74-01512 2K		***************************************
LUYTEN, S.	Analysis of Sediment Sorting in Alluvial Chan-	MARTIN, P.
	nels,	Arctic Data Buoys and Aidjex,
A Comparison of Fast Destruction Methods for	W74-01274 2J	W74-01156 71
the Determination of Trace Metals in Biological	MARRIAGON I G	
Materials,	MAKEMSON, J. C.	Barometric Pressure Measurements from
W74-01317 5A	Sand Beach Bacteria: Enumeration and	Buoys During AIDJEX 1972,
	Characterization,	W74-01159 71
LYNNWORTH, L. C.	W74-01444 5A	
Ultrasonic Thermometry,		MARVIN, K. T.
W74-01501 7B	MALYUK, G. A.	Some Effects of Filtration on the Determina
	Isotopic Composition of Oxygen and Hydrogen	tion of Nutrients in Fresh and Salt Water,
LYZENGA, D. R.	in Sulfide Waters of the Sochi-Adler Artesian	W74-01521 7
Techniques for Measuring Light Absorption	Basin (Izotopnyy sostav kisloroda i vodorada	
Scattering, and Particle Concentrations in	sul'fidnykh vod Sochi-Adlerskogo artezian-	MASSARI, K.
Water.	skogo basseyna),	Alluvion, Islands, and Sand Bars,
W74-01283 7B	W74-01394 2K	W74-01612 6
MACCONNELL, W. P.	MAMYRIN, B. A.	MASSART, D. L.
A Reliable and Inexpensive Soil Frost Gage,	Isotopic Composition of Helium in Thermal	A Comparison of Fast Destruction Methods for
W74-01574 2G	Springs of Iceland (Izotopnyy sostav geliya ter-	the Determination of Trace Metals in Biologica
***************************************	mal'nykh istochnikov Islandii),	Materials,
MACDONALD, A.	W74-01396 2K	W74-01317 5.
Small-Volume Solid-Electrode Flow-Through		
	MANAHAN, S. E.	MASSIE, L. B.
Electrochemical Cells. Preliminary Evaluation	Copper Micronutrient Requirement for Algae,	Element Constitution of Selected Aquati
Using Pulse Polarographic Techniques,	W74-01398 5C	Vascular Plants from Pennsylvania: Submerse
W74-01445 7B		and Floating Leaved Species and Rooted Emer
MACDONALD I B	The Importance of Chelating Agents in Natural	gent Species,
MACDONALD, J. R.	Waters and Wastewaters,	W74-01526 5.
Supersaturation of Nitrogen in Water During	W74-01326 5B	3.
Passage Through Hydroelectric Turbines at	JB	MATHEY, B.
Mactaquac Dam,	MANASTER, K. A.	Study of the Speed of Water Circulation in
W74-01432 5C	Early Thoughts on Prosecuting Polluters,	Water-Bearing Limestone Deposit by Tracin
	W74-01613 5G	Tests (La Serriere River Basin/NE),
MACDOWALL, J.		W74-01563
Planned Data Storage Methods for the Interna-	MANCHANDA, H. R.	

W74-01439

W74-01296

MACHLIS, L.

MACLELLAN, B. L. The Determination of Organo-Sulfur Com-

W74-01422

The Effects of Bacteria on the Growth and Reproduction of Oedogonium Cardiacum,

pounds by Thin-Layer Chromatography Via a Ligand-Exchange Precess,

tional Field Year for the Great Lakes,

7C

5A

MANCHANDA, H. R.

Effect of the Quality of Well Waters on Soils in Gurgaon District, W74-01252 2G

Thermal and Base-Catalyzed Hydrolysis Products of the Systemic Fungicide, Benomyl, W74-01504

MANTZ, P. A.

Cohesionless, Fine Graded, Flaked Sediment Transport by Water, W74-01125 2J

MATRYNOVA, M. V.

A Study of the Exchange of Dissolved Solids Between Bottom Sediments and Water of Different Water Bodies (Izucheniye obmena rast-vorennymi veshchestvami mezhdu donnymi otlozheniyami i vodoy razlichnykh vodoyemov), W74-01389

MATSUDA, R. I.

The Relations of Periphytic and Planktonic Algal Growth in an Estuary to Hydrographic Factors, W74-01571 5C

MATSUI, H.	MEHTA, R. J.	MOONEYHAN, D. W.
An Automated Method for the Dertemination	Studies on Methanol-Oxidizing Bacteria. I.	Land Use and Mapping,
of Trace Amounts of Metal Ions by Ion-	Isolation and Growth Studies,	W74-01165 4A
Exchange Chromatography. Determination of	W74-01535 5C	
zinc (II) in Waters,		MOORE, J. E.
W74-01438 5A	MEHTA, V. B.	Novel Method of Raman Data Acquisition,
	Physiological Ecology of Gelidiella Acerosa	W74-01330 2K
MAURER, D.	(Forsskal) Feldmann et Hamel,	MOODE W. F.
Effect of Spoil Disposal on Benthic Inver-	W74-01424 5C	MOORE, W. H.
tebrates,	MEI, C. C.	A Simple Portable Field Nephelometer,
W74-01420 5C	Note on the Equations of Long Waves Over an	W74-01247 7B
MCBRIDE, L. L.	Uneven Bottom,	MORAG, M.
Arizona's Coming Dilemma: Water Supply and	W74-01189 2E	Metabolic Effects of Drinking Brackish Water,
Population Growth,		W74-01632 5C
W74-01452 4A	MELLOR, J. G.	W 74-01032 3C
W14-01432	Application of Mathematical Modelling to	MOREAU, R.
MCCARTNEY, M. J.	Water Quality Management,	A Diseased Trout: Microbiological Study of Its
Concentrations of Some Trace Metals in	W74-01486 5B	Principal Organs and Its Environment,
Pelagic Organisms and of Mercury in Northeast		W74-01267 5C
Atlantic Ocean Water,	MELNICK, J. L.	
W74-01523 5C	Virus Concentration from Sewage,	MORIN, M.
	W74-01533 5D	Study of Chelated Mixtures of Ferric Ions with
MCCARTY, J. C.	MERCER, E. K.	Nitrilotriacetic, Sulfo-5-Salicylic and
Computer Simulation of Estuarial Networks,	Food Consumption of the Free-Living Aquatic	Pyrocatechol-3,5-Disulfonic Acids, (In French),
W74-01197 2L	Nematode Pelodera Chitwoodi,	W74-01440 5A
	W74-01225 5A	
MCCAULEY, R. W.	W74-01223	MORRIS, R. J.
Temperature Selection by Juvenile and Adult	MEYER, R. E.	Concentrations of Some Trace Metals in
Yellow Perch (Perca Flavescens) Acclimated to	Long Surf,	Pelagic Organisms and of Mercury in Northeast
24 C,	W74-01203 2E	Atlantic Ocean Water,
W74-01353 5A		W74-01523 5C
MCDUFFIE, J. R.	MEYER, R. F.	
Determination of Griscofulvin by Time-	Sensitivity of Cell Division and Cell Elongation	MOSIER, A. R.
Resolved Phosphorimetry,	to Low Water Potentials in Soybean	Precolumn Inlet System for the Gas Chromato-
W74-01224 5A	Hypocotyls,	graphic Analysis of Trace Quantities of Short-
W/4-01224 3A	W74-01249 3F	Chain Aliphatic Amines,
MCFETERS, G. A.		W74-01357 5A
Survival of Coliform Bacteria in Natural	MICHELSON, L. F.	MOTOMATCH T
Waters: Field and Laboratory Studies with	A Reliable and Inexpensive Soil Frost Gage,	MOTOMATSU, T.
Membrane-Filter Chambers,	W74-01574 2G	Effects of Shading and of Seasonal Differences
W74-01250 5B	MIHAI, G.	in Weathering on the Growth, Sugar Conten
	Bryocenological Research in Some Areas of the	and Sugar Yield of Sugar Beet Crops,
MCGARY, N. B.	Iron Gate of the Danube, (In Rumanian),	W74-01229 3F
Tidal Period Oscillations of an Isohaline Sur-	W74-01453 2I	MULLIGAN, H. F.
face Off the Mouth of the Columbia River,	117701733	Probable Causes for the 1972 Red Tide in the
W74-01188 2L	MILFORD, G. F. J.	Cape Ann Region of the Gulf of Maine,
	Effects of Shading and of Seasonal Differences	W74-01435 50
MCGIRR, D. J.	in Weathering on the Growth, Sugar Content	
Mechanism of NTA Degradation By a Bacterial	and Sugar Yield of Sugar Beet Crops,	MUNDT, J. O.
Mutant,	W74-01229 3F	Litmus Milk Reaction as a Distinguishing Fea
W74-01515 5B		ture Between Streptococcus Faecalis of Human
MCCBPCOR R C	MILHAM, P. J.	and Non-Human Origins,
MCGREGOR, R. C.	Prevention of Selenium Interference with Mea-	W74-01549 5A
The Influence of Topography and Pressure	surement of Phosphate as its Molybdenum (V-	
Gradients on Shoaling in a Tidal Estuary,	VI) Complex,	MYTELKA, A. I.
W74-01204 2L	W74-01345 5A	Heavy Metals in Wastewater and Treatmen
MCINTIRE, C. D.	MILLED A H	Plant Effluents,
Diatom Associations in Yaquina Estuary,	MILLER, A. H. Comparison of Gage and Radar Methods of	W74-01319 5A
Oregon : A Multivariate Analysis,	Convective Precipitation Measurement.	
W74-01430 5B	The state of the s	NAGATA, Y.
W/4-01430	W74-01149 2B	Experimental Study of Wave Reflection by
MCINTIRE, W. G.	MILLER, G. S.	Sloping Beach,
Beach Cusps,	Currents at Toledo Harbor,	W74-01223 21
W74-01180 2J	W74-01214 2H	
		NAKANISHI, M.
MCLELLAN, I. D.	MILLS, J. G. JR	Some Sources of Error in the 14C Method fo
Revisions and New Taxa in New Zealand	Biology of the Alabama Shad in Northwest	Estimating Primary Productivity and Thei
Notonemouridae (Insecta: Plecoptera),	Florida,	Relationship to Light Intensity During Incuba
W74-01299 2I	W74-01248 2I	tion,
		W74-01217 21
MCMASTER, W. M.	MINKIN, M. B.	NABITABLE & B
Ground-Water Yield Potential in Knox County,	Study of Soil Plasticity over a wide Range of	NAPHADE, J. D.
Tennessee,	Soil Moisture Contents,	Effect of Puddling on Physical Properties o
W74-01147 7C	W74-01636 2G	Rice Soil,
MEHROTRA, S. C.	MOINAR C I	W74-01246 31
Boundary Contractions as Controls in Two-	MOLNAR, G. J. Data Acquisition and Storage for Research	NEAL, J. D.
Laver Flows.	Watersheds.	Microbial Culture Media Preparation,
W74-01276 8B	W74-01295 7C	W74-01505 5/
00		31

*

5A

NEAL, R. A.

Some Effects of Filtration on the Determination of Nutritin in Fresh and Salt Water. W7-401321 NEWELL, B. The Effect of Microbial Activity Upon the Sedimentary Subplict Cycle, with the Sediment Tourisms of the Arov Sea After the Control of THE Don Kircle, (in Reasistan). W7-401237 W7-401237 W7-401237 W7-401237 W7-401239 DOD, N. NEWTON, M. P. The Determination of Lead and Nickel by Armic Absorption Spectrometry with a Jackine Loop Atomics, with the Sediment Tourisms of Sediment Sediment Tourisms of Sediment Tourisms of Sediment Sediment Tourisms of Sediment Tourisms of Sediment Tourisms of Sediment Tourisms of Sediment Sediment Tourisms of Sediment Tourisms of Sediment Sediment Tourisms of Sediment Sediment Tourisms of Sediment Sediment Sediment Tourisms of Sediment Se	NEAL, R. A.	NOWAK, M.	OLSON, K. R.
REWFILL, D. B. The Effect of Microbial Activity Upon to Sedimentary Subjuber Cycle, with Activity and Hydrologian Spectrometry with a Flameless Wire Loop Admirer, with Spectrometric and States of Hydrologian Spectrometry with a Flameless Wire Loop Admirer, with Spectrometric and States of Wire-1913 Schotters in Social and Ground Water Beneath Increased and Nickel By Wire-1913 Schotters in Social and Ground Water Beneath Increased and Products of the Systemic Fungicide, Benomy, Wire-1913 Swift-Bill Schotters in Social and Ground Water Beneath Invited Swift-Bill Schotte	Some Effects of Filtration on the Determina-		Uptake of Methyl Mercuric Chloride and Mer-
NEWFLI, D. B. The Effect of Microbial Activity Upon the The Effect of China-Clay Wastes on Stream In Water (China-Clay Wastes on Stream In Waster (China-Clay Wastes on Stream			
NEDWELL, D. B. The Effect of Microbial Activity Upon the Sedimentary Sulphur Cycle, Sediment Transport in Coastal Plain Estuary, Sediment Transport in a Coastal Plain Estuary, Sediment Transport in a Coastal Plain Estuary, Sediment Transport in Sediment T	W74-01521 7B	W/4-0160/	
The Effect of China-Clay Wates on Stream Investigation of Spectrophotometric Analysis of Sedimentary Supplied Cycle, W74-01299 W74-01299 W74-01294 SANGWITHOLAS, M., Y.A. Zoobeathos of the Arov Sea After the Coatol of TRE Don Kirer (in Russian), W74-01297 W74-01297 ZH. Singilited Spectrophotometric Analysis of Crownall, W74-01297 W74-01297 ZH. South Spectrophotometry, W74-01408 W74-01297 ZH. South Spectrophotometric Acetate by Macrory-Resistant Bacteria, W74-01355 W74-01355 NEWYTON, M. P. The Determination of Lead and Nickel by Admire-Absorption Spectrometry with a Flameless Wire Loop Atomizer, W74-01405 And Coology of Coology o	NEDWELL, D. B.	NUTTALL, P. M.	
W74-01297 NEELY, W. C. Determination of Grissofulvin by Time-Determination of Grissofulvin by Time-Constant Plant of Selenium, W74-0124 NEKRASOVA, M. Y.A. Zoobenthos of the Azov Sea After the Control of Time Regional Extension of Phenylmercuric Acetate by Microry-Resistant Bacteria, W74-0125 NELSON, J. D. Biologradation of Phenylmercuric Acetate by Microry-Resistant Bacteria, W74-0125 NEWTON, M. P. To CONNELL, A. W. Gas-Solid Chromatography on Macroreticular Carlion Exchange Resins. NEWTON, M. P. To CONNELL, A. Soundy of Tidal Dispersion in the Potomac River. W74-01195 NEWTON, M. P. To Connect and Nickel by Atomic-Absorption Spectrometry with a Macro-Boretin at Coastal Plain Estuary, W74-0135 NEWTON, M. P. To Constant Plain Estuary, W74-0135 NICHOLS, M. Seminent Transport in a Coastal Plain Estuary, W74-01195 NIELSEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-0127 NIELSEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01197 NIKETIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional noy dinamitis artezia-stakish vol.), W74-01197 NOBURL, R. H. Seminengal Electroanalysis: Shapes of W74-01197 NOBURL, R. H		•	
NELLY, W. C. Determination of Griseofulvin by Time- Reached Phosphorimetry, W74-0124 NEKRASOVA, M. Y. A. Zoobeathos of the Azov Sea After the Control GTEE Don River, (in Russian) W74-01257 NELSON, J. D. Biodegradation of Phenylmercuric Acetate by Mresury-Resistant Bacteria, W74-01355 NEWTON, M. P. The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a Financies Wire Loop Atomizer, W74-01355 NEWTON, M. P. The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a Financies Wire Loop Atomizer, W74-01355 NCHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01185 Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a Financies Wire Loop Atomizer, W74-01185 DALAIG, T. O. Dalaid, G. T. O. The Distribution, Composition and Biomass of the River Estuaries, W74-01259 On the Vertical Structure of Tidal Flow in Review Estuaries, W74-01350 DALAIG, T. O. The Distribution, Composition and Biomass of the Crusticaces and Evertical Structure of Tidal Flow in Review Estuaries, W74-01350 DALAIG, T. O. The Distribution, Composition and Biomass of Compos			
DELETRINATION OF Grissorlalvin by Time- Revoluted Supplicitation of Grissorlalvin by Time- Revoluted Supplicitation of Constitution of the Arow Sea After the Control of THE Don River, (in Russian), W74-01245 NELSON, J. D. Biodegradation of Phenylmercuric Acetate by Mcreury-Resistant Bacteria, W74-01355 NEWTON, M. P. O'CONNELL, R. L. NESTON, J. D. Biodegradation of Phenylmercuric Acetate by Mcreury-Resistant Bacteria, W74-01355 NEWTON, M. P. O'CONNELL, R. L. O'CONNELL,	W74-01239 5B	W/4-0132/	
Determination of Griscolulvin by Time. Realowld Phopspherinetry, W7401224 W7401224 W7401237 W7401237 WREASOVA, M., Y.A. Zoobenthos of the Azov Sea After the Control of THE Don River, (in Russian), W7401237 WREASOVA, J. D. Biologradation of Phenylmercuric Acetate by Receive Region and Storage Metals and Bacteria, W7401353 SWY-040355 SWWTON, M. P. OCONNELL, R. L. A Study of Tidal Dispersion in the Potomac River, (in Russian), W7401353 SWWTON, M. P. ODB, N. OF The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a Planetess Wire Loop Atomice, W7401353 SWWTON, M. P. W7401353 SWWTON, M. P. W7401354 Sediment Transport in a Coastal Plain Estuary, W7401355 SWWTON, M. P. W7401355 SWWTON, M. P. W7401356 SWWTON, M. P. W7401357 SWWTON, M. P. W7401358 SWWTON, M. P. W7401359 SWWTON, M. P. W7401359 SWWTON, M. P. W7401350 SWWTON, M. P. W7401360 SWWTON, M. P. W7401360 SWWTON, M. P. W7401360 SWWTON, M. P. W7401370 SWWTON, M. P. W7401360 SWWTON, M	NEELY, W. C.	The Effect of Sand Deposition Upon the	
NEKRASOVA, M. YA. ZOONNELLA .W. Gas-Solid Chromatography on Macroreticular Contribution of THE Don River, (in Russian), W74-0189 NELSON, J. D. Biodegradation of Phenylmercuric Acetate by Mcreary-Resistant Bacteria, W74-0189 NEWTON, M. P. NEWTON, M. P. NEWTON, M. P. The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a Flameless Wire Loop Atomizer, W74-0180 NCHOILS, M. Sediment Transport in a Coastal Plain Estuary, W74-01363 NICHOILS, M. Sediment Transport in a Coastal Plain Estuary, W74-01363 NEMERER, W. Problement Transport in a Coastal Plain Estuary, W74-01369 NEELESN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Biological Tissues, W74-0137 NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01369 NEELESN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Biological Tissue, W74-0137 NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01369 NEELESN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Biological Tissue, W74-0137 NICHITINA, M. Problems in Regional Dynamics of Artesian Water (Problems in Regional Dynamics of Artesian Sichly work) W74-0137 Regional Estimate of Brackish- and Saline-Groundwater Preference of the Carlogue Problems in The Soviet Darms Program—Twenty Years of Development, Deployment, and Data W74-0137 Regional Estimate of Brackish and Saline-Groundwater Preference in Fresh and Brackish Water Region of the Elibe Estuary, (In German), W74-01134 NODWELL, B. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01359 NOBERIS, J. D. NOBERIS, J. D. Robert Mark Mark Mark Mark Mark Mark Mark Mark		Macro-Invertebrate Fauna of the River Camel,	W /4-01406 2K
NEKRASOVA, M. YA. Zoobenhos of the Azov Sea After the Control of THE Does River, (In Reasian). W74-0137 ZOODENhos of the Azov Sea After the Control of THE Does River, (In Reasian). W74-0135 NEKISON, J. D. Biodegradation of Phenylmercuric Acetate by Mercury-Resistant Bacteria, W74-0155 NEWTON, M. P. The Determination of Lead and Nickel by Flameless Wire Loop Atomizer, W74-0155 NICHOLS, M. Sedinent Transport in a Coastal Plain Estuary, W74-0135 NICHOLS, M. Sedinent Transport in a Coastal Plain Estuary, W74-01136 NICHOLS, M. Sedinent Transport in a Coastal Plain Estuary, W74-01136 NICHOLS, M. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01265 NICHOLS, M. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-0137 NIGHTINGALE, H. I. Nitrates in Soil and Ground Water Beneath Irrigated and Pertilized Crops, W74-0136 NIKITIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional rooy dinamik) artesian Water (Problemy regional rooy dinamik) artesian Water (Problemy regional rooy dinamik) artesian Sidelengan Problems in Regional Dynamics of Artesian Water (Problemy regional rooy dinamik) artesian Sidelengan Problems in Regional Dynamics of Artesian Water (Problemy regional rooy dinamik) artesian Sidelengan Problems in Regional Dynamics of Artesian Water (Problemy regional rooy dinamik) artesian Sidelengan Problems in Regional Dynamics of Artesian Sidelengan Problems in Regional Dynamics of Artesian Sidelengan Problems in Their Complex Use (Vodroyse The Soviet Darms Program—Twenty Years of Development, Deployment, and Data, W74-01137 Regional Estimate of Brackish-hard Salinc-Groundwater Yield (Regional Problems) Annual Problems in Their Complex Use (Vaddyser Avidol25 NOBELL, A. W. COENTRICAL B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-0137 Altonic Absorption Method for Determining Micromolar Quantities of Aliphatic Secondary Alnines, W74-0138 OLENIA S. B. Poblems in Regional Dynamics of Artesi	Resolved Phosphorimetry,		OLSON, T. A.
Cas-Solid Chromatography on Macroreticular Catobenhos of the Azov Sea After the Control of THE Don River, (in Russian), NELSON, J. D. Biodegradation of Phenylmercuric Acetate by Mercury-Resistant Bacteria, W74-01955 NEWTON, M. P. NEWTON, M. P. The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a Flameless Wire Loop Atomizer, W74-01956 NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01185 ADD. N. NICHOLS, M. Sediment Transport in Coastal Plain Estuary, W74-01185 ADD. N. NIELEER MEIR, W. Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-01346 NIELSEN, S. A. NIGHTINGALE, H. I. Nitrates in Soil and Ground Water Beneath Irrigated and Fertilized Crops, W74-01304 APPOCIATION M. F. Regional Estimate of Brackish- and Sainc-Groundwater Yield (Regional Payamics of Artesian Water (Problemy regional noy dinamiki arteziankish vold), W74-01141 Process on a Daliy Basis. Problems in Regional Dynamics of Artesian Water (Problemy regional noy dinamiki arteziankish vold), W74-01141 Process on a Daliy Basis. Problems in Regional Dynamics of Artesian Water (Problemy regional noy dinamiki arteziankish vold), W74-01141 Process on a Daliy Basis. Problems in Regional Dynamics of Artesian Water (Problemy regional nay ottemba, Science) And Processing of Glacin Riversity and Propertical Regional Regional Propertical R	W74-01224 5A	W74-01244 21	The Distribution, Composition and Biomass of
Zoobenhos of the Azov Sea After the Control of THE Don Kirer, (In Russian), W74-0137 NELSON, J. D. Biotegradation of Phenylmercuric Acetate by Microry Resistant Bacteria, W74-0195 NEWTON, M. P. NEWTON, M. P. ODD, N. OBLIGHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01195 NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01196 NICHOLS, M. Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-01946 NIELSEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01127 NIGHTINGALE, H. I. Nitrates in Soid and Ground Water Beneath Irrigated and Fertilized Crops, W74-01134 Problems in Regional Dynamics of Artesian Water (Problems y regional noy dinamiki arteziankikh vold). W74-0114 Problems in Regional Dynamics of Artesian Water (Problems y regional noy dinamiki arteziankikh vold). W74-01137 NOBUELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lake, W74-01136 NOBUELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lake, W74-01136 NOBUELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lake, W74-0136 NOBUELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lake, W74-0136 NOBUELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lake, W74-0136 NOBUELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lake, W74-0136 NOBUELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lake, W74-0136 NOBUELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lake, W74-0136 NOBUELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lake, W74-0137 OLES, P. J. OLES, P. J. OLES, P. J. OLEVINSKAYA, S. K. Experimental Investigation	NEKRASOVA, M. YA.	O'CONNELL, A. W.	the Crustacean Zooplankton Population in
of THE Don River, (in Russian). WT4-0137 NELSON, J. D. Biodegradation of Phenylmercuric Acetate by Mcreury-Resistant Bacteria, WT4-0155 NEWTON, M. P. The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a WT4-0165 NEWTON, M. P. The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a WT4-0165 NCHOLS, M. Sediment Transport in a Coastal Plain Estuary, WT4-0185 AND CHOLS, M. Emission Spectrometric Determination of Trace Metals in Biological Tissues, WT4-0136 NELSEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, WT4-01372 AND CHOLS, M. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, WT4-01372 ANGIFITN ALE, H. I. Nitrates in Soil and Ground Water Beneath Irrigated and Fertilized Crops, WT4-01303 Problems in Regional Dynamics of Artesian Water (Problems regional noy dinamikit arteziankikh vod) (WT4-0117) Regional Estimate of Brackish- and Saine-Groundwater Yeled (Regional naya ostecaks aksplatatisionsykh resurrow solonovatykh i Amonical Froncesson of Carlo (Lead of County) (WT4-01137) Regional Estimate of Brackish- and Saine-Groundwater Yeled (Regional naya ostecaks aksplatatisionsykh resurrow solonovatykh i Amonical Froncesson of Carlo (Lead of County) (WT4-01137) Regional Estimate of Brackish- and Saine-Groundwater Yeled (Regional naya ostecaks aksplatatisionsykh resurrow solonovatykh i Amonical Froncesson (Lead of County) (WT4-01137) Regional Estimate of Brackish- and Saine-Groundwater Yeled (Regional naya ostecaks aksplatatisionsykh resurrow solonovatykh i Amonical Froncesson (Lead of County) (Lead of Coun		Gas-Solid Chromatography on Macroreticular	
NELSON, J. D. Biodegradation of Phenylmercuric Acetate by Mercury-Resistant Bacteria, W74-01355 58 NEWTON, M. F. The Determination of Lead and Nickel by Atomic Absorption Spectrometry with a W74-01363 59 NEWTON, M. F. The Determination of Lead and Nickel by Atomic Absorption Spectrometry with a W74-01363 50 NICHOLS, M. Sediment Transport in a Coastal Plain Estury, W74-01365 NICHOLS, M. Sediment Transport in a Coastal Plain Estury, W74-01365 NICHOLS, M. Sediment Transport in a Coastal Plain Estury, W74-01365 NIESEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01372 CAN NIELSEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01372 ANIGHTINGALE, H. I. Nitrates in Soil and Ground Water Beneath International Process on a Daily Basis, W74-01373 Sproblems in Regional Dynamics of Artesian Water (Problemy regional noy dinamiki arteziankikh vold), W74-01147 ANIGHTINGALE, H. I. Nitrates in Soil and Ground Water Beneath International Process on a Daily Basis, W74-01137 ANIGHTIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional noy dinamiki arteziankikh vold), W74-01137 ANIGHTIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional noy dinamiki arteziankikh vold), W74-01137 ANIGHTIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional noy dinamiki arteziankikh vold), W74-01137 ANIGHTIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional noy dinamiki arteziankikh vold), W74-01137 ANIGHTIN, M. R. Polama Basimate of Brackish- and Salinca Groundwater Yield (Regional Paya otsenha eksphatatations) Problems regional noy dinamiki arteziankikh vold, W74-01137 ANIGHTIN, M. R. Planaed Data Storage Methods for the International Problems of Prob	of THE Don River, (In Russian),		W74-01109 50
Biodegradation of Phenylmercuric Acetate by Microry-Resistant Bacteria, W74-01955 SB NEWTON, M. P. The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a Planneless Wire Loop Atomizer, W74-01363 NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01185 A Study of Tidal Dispersion in the Potomac River, W74-01363 ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01363 ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01363 ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01363 ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01363 ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01363 ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01363 ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01363 ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01363 ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01363 ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01363 ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01363 ODD, N. ODD, N. On the Vertical Structure of Tidal Flow in River Batuaries, W74-01165 ODD, N. ODD, N. ODD, N. ODD, N. ODD, N. OTH Chattholino, Composition and Biomass of the Crustacean Zooplankton Population in Western Lake Superior. W74-01185 ODERTICAL G. T. ODERTICAL G. T	W74-01257 2L	W74-01495 5A	OMMANNEY, C. S. L.
Biodegradation of Phenylmercuric Acetate by Mercury-Resistant Bacteria, W74-01555 NEWTON, M. F. The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a Flameless Wire Loop Atomizer, W74-01365 NEWTON, M. F. The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a Flameless Wire Loop Atomizer, W74-01365 A DDD, N. On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 A DDD, N. On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 A DDD, N. On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 A DDD, N. On the Vertical Structure of Tidal Flow in River Estuaries, W74-01369 A DDD, N. On the Vertical Structure of Tidal Flow in River Estuaries, W74-01369 A DDD, N. On the Vertical Structure of Tidal Flow in River Estuaries, W74-01369 A DDD, N. On the Vertical Structure of Tidal Flow in River Estuaries, W74-01369 OPEN Crustacean Zooplankton Population in Western Lake Superior, W74-01369 OPEN Crustacean Zooplankton Population in Western Lake Superior, W74-01372 COGAWA, J. M. Thermal and Base-Catalyzed Hydrolysis Products of the Systemic Fungicide, Benomyl, W74-01340 Sediment Transport in a Coastal Plain Estuary, W74-01369 A Summerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01372 A NIGHTIN GALE, H. I. NIKITIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional Products of the Systemic Fungicide, Benomyl, W74-01340 Seminitegral Electrosanalysis: Shapes of Neopolarograms, W74-01353 OLINE, S. R. NOBORELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01379 A Michael Structure of Tidal Flow in River Estuary, (in Greman) Approach, W74-01340 Seminitegral Electrosanalysis: Shapes of Neopolarograms, W74-01340 OLINE, J. M. NOBORELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01379 A W74-01312 OLINE, J. M. Relationally Management, Deployment, and Data Water Qualit	NELSON I D	O'CONNELL, R. L.	Acquisition, Storage and Processing of Glacier
Mercury-Resistant Bacteria, W74-01195 58 NEWTON, M. P. The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a Flameless Wire Loop Atomizer, W74-01185 54 NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01185 21. NIEDERMEIER, W. Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-01127 24 NIEDERMEIER, W. Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-01127 25 NIEDERMEIER, W. Emission of Marking M74-01127 25 NIEDERMEIER, W. Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-01127 24 NIGHTINGALE, H. I. Nitrates in Soil and Ground Water Beneath Irrigated and Perilized Crops, W74-01127 25 NIGHTIN, M. R. Problems in Regional Dynamics of Artesian Water Marking W74-01137 25 Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional Paya otsenka shaphatations) with respective M74-01137 45 NOBURLI, B. H. Planned Datas Storage Methods for the International Field Year for the Great Lakes, W74-01137 45 NOBURLI, B. H. Planned Datas Storage Methods for the International Field Year for the Great Lakes, W74-01137 45 NOBURLI, B. H. Planned Datas Storage Methods for the International Field Year for the Great Lakes, W74-01137 45 NOBURLI, B. H. Planned Datas Storage Methods for the International Field Year for the Great Lakes, W74-01137 45 NOBURLI, B. H. Planned Datas Storage Methods for the International Field Year for the Great Lakes, W74-01137 45 NOBURLI, B. H. Planned Datas Storage Methods for the International Field Year for the Great Lakes, W74-01137 45 NOBURLI, B. H. Planned Datas Between Turbidity and Hydrographical Factors in Fresh and Brackish water Region of the Ethe Estuary, (in German), W74-01157 57 NOETHLICH, I. Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish water Region of the Ethe Estuary, (in German), W74-01157 57 NOETHLICH, I. Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish water Region of the Ethe Estuary, (in G		A Study of Tidal Dispersion in the Potomac	
NEWTON, M. P. The Determination of Lead and Nickel by Atonic-Absorption Spectrometry with a Flameless Wire Loop Atomizer, W74-0135 NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01185 NIEDERMEIER, W. Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-01346 NRELSEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01372 ANIGHTINGALE, H. I. Nitrates in Soil and Ground Water Beneath Irrigated and Fertilized Crops, W74-01337 NIKITIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional Proportion) of Composition and Board Products of the Systemic Fungicide, Benomyl, W74-01137 NIKITIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional Products of the Systemic Fungicide, Benomyl, W74-01134 Regional Estimate of Brackish and Saline Groundwater Vield (Regional nays otestak eksplustatisionsykh resurrow solonovatykh is solenykh podzemnykh vod), W74-01137 Regional Estimate of Brackish and Saline Groundwater Vield (Regional nays otestak eksplustatisionsykh resurrow solonovatykh is solenykh podzemnykh vod), W74-01137 Regional Estimate of Brackish and Saline Groundwater Vield (Regional nays otestak eksplustatisionsykh resurrow solonovatykh is solenykh podzemnykh vod), W74-01137 Regional Estimate of Brackish and Saline Groundwater Vield (Regional nays otestak eksplustatisionsykh resurrow solonovatykh is solenykh podzemnykh vod), W74-01137 Regional Estimate of Brackish and Saline Groundwater Vield (Regional nays otestak eksplustatisionsykh resurrow solonovatykh is solenykh podzemnykh vod), W74-01136 NOBVELL, B. H. Regional Factors in Fresh and Brackish water Remail Problems of Regional Problems of Regional Problems of Regional Problems of Regional Regional Problems of Reg			W74-01292 70
NEWTON, M. P. The Determination of Lead and Nickel by Atomic-Absorption Spectrometry with a Flameless Wire Loop Atomizer, W74-0125 5. NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01185 5. NIEDERMEIER, W. Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-01305 5. NIELSEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01372 21. NIGHTINGALE, H. I. Nitrates in Soil and Ground Water Beneath Irrigated and Fertilized and Fertilized and Fertilized for Foroughein of Market and Saline Groundwater Yield (Regional Inay) dismanikit artezianskik Vood), W74-01137 48 NOBWELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01236 78 NOBUBLL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01236 78 NOBUBLL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01236 78 NOBUBLL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01236 78 NOBUBLL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01260 79 NOBUBLL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01260 79 NOBUBLL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01260 79 NOBUBLL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01260 79 NOBUBLL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01260 79 NOBUBLL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01260 79 NOBUBLL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01260 79 NOBUBLL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01270 79 NOBUBLL, B. H. Planned Data Storage Methods for the Inter	W74-01555 5B	W74-01196 5B	ONDOK. P.
On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 On the Vertical Structure of Tidal Flow in River Estuaries, W74-01365 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01365 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01365 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01365 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01365 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01366 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01366 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01366 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01366 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01366 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01366 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01366 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01366 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01366 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01366 On the User Indian Structure of Tidal Flow in River Estuaries, W74-01366 On the User Indian Structure of Tidal Estuaries, W74-01366 On the User Indian Structure of Tidal Estuaries of M74-0154 On the User Indian Structure of Ti	NEWTON M B	ODD, N.	
Atomic-Absorption Spectrometry with a Flameless Wire Loop Atomizer, W74-01363 NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01185 NIEDERMEIER, W. Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-01185 NIELSEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01127 ANDICHTING ALE, H. I. Nitrates in Soil and Ground Water Beneath Irrigated and Fertilized Crops, W74-01141 NIERTIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional 'noy dinamiki artezianskikh vod), W74-01141 ZF Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsease eksplustatisionsykh resursov solonovatykh isolenykh podzemykh vod), W74-01137 ANDOWELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-0193 NORWIS, J. D. (LIKE, J. R. Experimental Investigation of Spectral Overlap of the Neon 339-332-nm and Chromium 359, 349-ams Spectral Lines in Atomic Absorption and Atomic Absorption and Atomic Absorption and Chromium 359, 349-ams Spectral Lines in Atomic Absorption and Atomic Absorption a			Root/Shoot Ratio in Reedswanp Macrophytes
Flameless Wire Loop Atomizer, W74-01203 5A NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-0183 5A NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-0118 52 NIEDERMEIER, W. Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-0156 5A NIELSEN, S. A. NI	· · · · · · · · · · · · · · · · · · ·		
NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01185 2L. NIEDERMEIER, W. Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-01546 NIELSEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01172 2A. NIGHTING ALE, H. I. Nitrates in Soil and Ground Water Beneath Irrigated and Fertilized Crops, W74-01245 3F NIKITIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional rooy dinamiki artezianskith vod), W74-01141 2F Regional Estimate of Brackish- and Groundwater Yield (Regional naya otsenka ekspluatationnykh resursov solonovalyth is solenykh podzemnykh vod), W74-01197 4B NODWELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01296 NORBIS, J. D. NORBIS, J. D. NORBIS, J. D. The Distribution, Composition and Biomass of the Crustacean Zooplankton Population of Crustacean Zooplankton Population Crustacean Zooplankton Population of Crustacean Zooplankton Population of Crustacean Zooplankton Population Scorean Lakes Superior Z. W74-01540 OBEMELSEN, S. A. Cobservations of Net Shoreline Positions and Approximations of Barrier Island Sediments Under Scorean Populations of Sectral Crops and Products of the Systemic Fungicide, Benomyl, W74-01573 OLDINA, K. B. Semining Endurance Cooplankton Population of Custacean Zooplankton Population Population Scorean Populations of Sectral Crops of Sostina Populations of Pulsed Voltametr Val-01579 OLDINA, K. B. Semini		W74-01205 2L	W74-01346 2
NICHOLS, M. Sediment Transport in a Coastal Plain Estuary, W74-01185 2L. NIEDERMEIER, W. Emission Spectrometric Determination Trace Metals in Biological Tissues, W74-01546 5A NIELSEN, S. A. Problems in Regional Dynamics of Artesian Water (Problemy regional 'noy dinamiki arteziankikh vod), W74-01137 MY4-01137 MY4-01137 MY4-01137 MY4-01137 MY4-01137 MY4-01137 MY4-01139	W74-01363 5A	ODLAUG, T. O.	OSEID, D.
Sediment Transport in a Coastal Plain Estuary, W74-01185 NIEDERMEIER, W. Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-0156 NIELSEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01127 NIGHTINGALE, H. I. Nitrates in Soil and Ground Water Beneath Irrigated and Fertilized Crops, W74-01354 NY4-01354 NY4-01354 NY4-01364 NY4-01364 NY4-0137 Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional 'naya otsenka ekspluatatistonalyk resursov solonovatykh i solenykh podzemnykh vod), W74-01137 NODWELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01266 NORRIS, J. D. A thomic Absorption Method for Determining water Quality in Whetstone Creek, W74-01379 NORRIS, J. D. NORRIS, J. D. A thomic Absorption mad kinematics of Flow (Exsperimental lavoet issalion of Spectral Coverlap of the Neon 339-332-am and Chromium 339-349-am Spectral Lines in Atomic Absorption and Atomic Chromium 339-349-am Spectral Lines in Atomic Absorption and Atomic Chromium 339-349-am Spectral Lines in Atomic Absorption and Atomic Absorption and Approximations of Barrier Island Sediments and Approximations of Barrier Is	NICHOLS M	The Distribution, Composition and Biomass of	
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Emission Spectrometric Determination of Trace Metals in Biological Tissues, W74-01564 5A NIELSEN, S. A. NIELSEN, S. A. NUMerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01127 2DA NIGHTINGALE, H. I. Nitrates in Soil and Ground Water Beneath Irrigated and Fertilized Crops, W74-01245 3F NIKITIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional noy dinamkia artezianskikh vod), W74-01141 2F Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional'naya otsenka ekspluatatsionnykh resursov solonovatykh isolonykh podzemnykh vod), W74-01137 4B NODWELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01996 7C NOETHLICH, I. Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish water Region of the Ebbe Estuary, (in German), W74-01260 5B NORRIS, J. D. Investigation of Spectral Overlap of the Neon 359:352-mm and Chromium 359:349-mn Spectral Lines in Atomic Absorption and Adapproximations of Barrier Island Sediment Approximations of Barrier Island Sediment Budgets, W74-01372 2L OGAWA, J. M. Thermal and Base-Catalyzed Hydrolysis Products of the Systemic Fungicide, Benomyl, W74-01245 5A OLDHAM, K. B. Semiintegral Electroanalysis: Shapes of Neopolarograms, W74-01333 5A OLENICOFF, S. M. The Soviet Darms Program-Twenty Years of Development, Deployment, and Data, W74-01137 7C OLES, P. J. CLES, P. J. Allomic Absorption Method for Determining Micromolar Quantities of Aliphatic Secondary Amines, W74-01492 5A OLEVINSKAYA, S. K. Experimental Investigation of the Effect of Salating Sediments on Kinematics of Flow (Eksperimental'noye issledovanily vilyariya salting Sediments on Kinematics of Flow (Eksperimental'noye issledovanily vilyariya salting Sediments on Kinematics of Flow (Eksperimental'noye issledovanily vilyariya salting Sediments on Kinematics of Flow (Eksperimental'noye issledovanily vilyariya salting Sediments on Kinematics of Flow (Eksperimental'noye issledovanily vilyariya	AMBRODAL COMP.	W/4-01109	
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NIELSEN, S. A. Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis, W74-01127 2A NIGHTINGALE, H. I. Nitrates in Soil and Ground Water Beneath Irrigated and Fertilized Crops, W74-01245 3F NIKITIN, M. R. Problems in Regional Dynamics of Artesian Water (Problemy regional noy dinamiki artezianskikh vod), W74-01141 2F Regional Estimate of Brackish- and Saline-Groundwater Yield (Regional) naya otsenka dexpluatationnykh resursov solonovatykh i solenykh podzemnykh vod), W74-01137 4B NODWELL, B. H. Planned Data Storage Methods for the International Field Year for the Great Lakes, W74-01266 7C NOETHLICH, I. Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish-Water Region of the Elbe Estuary, (In German), W74-01266 5D NORRIS, J. D. Investigation of Spectral Overlap of the Neon 359-332-mm and Chromium 359-349-am Spectral Lines in Atomic Absorption and Atomic Contribution to Physicochemical Study of Contribution to Physicochemical St			Analytical Applications of Pulsed Voltammetric
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NOETHLICH, I. Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01260 NORRIS, J. D. Investigation of Spectral Overlap of the Neon 359.352-nm and Chromium 359.349-nm Spectral Lines in Atomic Absorption and Atomic NOERIS, J. D. Investigation of Spectral Overlap of the Neon 359.352-nm and Chromium 359.349-nm Spectral Lines in Atomic Absorption and Atomic Accounty Ohio (Scioto River Basin), W74-0157 OLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 OLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-0157 SB OLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-0157 SB OLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-0157 SB OLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-0157 SB OLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-0157 SB OLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-0157 SB OLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-0157 SB OLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-0157 SB OLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-0157 PALYANITSYNA, L. I. Productivity of Cereal Crops on Eroded Chenocate Macroinvertebrates as Indexes of Water Quality in Whetstone			DATIAC I P ID
NOETHLICH, I. Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01260 NORRIS, J. D. Investigation of Spectral Overlap of the Neon 359,352-nm and Chromium 359,349-nm Spectral Lines in Atomic Absorption and Atomic NOETHLICH, I. W74-01134 2J Photosynthetic Rater of Several Crop Plants, W74-01597 2 PALYANITSYNA, L. I. Productivity of Cereal Crops on Eroded Che nozems Against Both Non-Fertilized and Fert ized Backgrounds, (In Russian), W74-01557 2 PAPADAKIS, E. P.	W74-01296 7C		
Relationships Between Turbidity and Hydrographical Factors in Fresh and Brackish Water Region of the Elbe Estuary, (In German), W74-01260 NORRIS, J. D. Investigation of Spectral Overlap of the Noon 359,352-nm and Chromium 359,349-nm Spectral Lines in Atomic Absorption and Atomic NORRIS, J. D. Long in Atomic Absorption and Atomic W74-01517 W74-01517 DLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow Cre	NOETHLICH, I.		
graphical Factors in Fresh and Brackish Water Region of the Eibe Estuary, (In German), W74-01260 SB NORRIS, J. D. Investigation of Spectral Overlap of the Neon 359.352-nm and Chromium 359.349-nm Spectral Lines in Atomic Absorption and Atomic Lines in Atomic Absorption and Atomic OLIVE, J. H. Benthic Macroinvertebrates as Indexes of Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 SB PALYANITSYNA, L. I. Productivity of Cereal Crops on Eroded Che nozems Against Both Non-Fertilized and Fert ized Backgrounds, (In Russian), W74-01557 OLLIER, J. Contribution to Physicochemical Study of PAPADAKIS, E. P.		W /4-01134 2J	
W74-01260 5B Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Span and Chromium 359,349-nm Spectral Lines in Atomic Absorption and Atomic Water Quality in Whetstone Creek, Morrow County, Ohio (Scioto River Basin), W74-01517 Span Span Span Spectral OLLIER, J. Contribution to Physicochemical Study of PAPADAKIS, E. P.	graphical Factors in Fresh and Brackish Water	OLIVE, J. H.	BAT WANTEDWAY V
NORRIS, J. D. Investigation of Spectral Overlap of the Neon 359,352-nm and Chromium 359,349-nm Spectral Lines in Atomic Absorption and Atomic NORRIS, J. D. County, Ohio (Scioto River Basin), W74-01517 SB investigation of Spectral Overlap of the Neon 359,352-nm and Chromium 359,349-nm Spectral Contribution to Physicochemical Study of PAPADAKIS, E. P.			
NORRIS, J. D. Investigation of Spectral Overlap of the Neon 359.352-nm and Chromium 359.349-nm Spectral Lines in Atomic Absorption and Atomic Contribution to Physicochemical Study of PAPADAKIS, E. P.	W/4-01200 5B		
Investigation of Spectral Overlap of the Neon 359.352-nm and Chromium 359.349-nm Spectral Lines in Atomic Absorption and Atomic Contribution to Physicochemical Study of PAPADAKIS, E. P.	NORRIS, J. D.		
Lines in Atomic Absorption and Atomic Contribution to Physicochemical Study of PAPADAKIS, E. P.	Investigation of Spectral Overlap of the Neon		
			DADADAKIS V D
or and the control of the con			
Maria a sana	Marie a constant		

PASTERNAK, K.	POPOVICH, M. L.	KAHN, P. H.
Occurrence and Cumulation of Microcom-	A Cost-Effectiveness Study and Analysis of	Calculation of Permeability of Cretaceous
ponents in Bottom Sediments of Dam Reser-	Municipal Refuse Disposal Systems,	Sandstones from Pumping and Static Level
voirs of Southern Poland,	W74-01631 5E	Data in Selected Areas of Western South
W74-01565 5B	DODTED I B	Dakota,
DATES WHITE	PORTER, L. R.	W74-01113 2F
PATRICK, W. H. JR	Geothermal Resource Investigations,	DAMAZANON B I
Nitrate Reduction in Soils: Effect of Soil	W74-01273 4B	RAMAZANOV, F. I.
Moisture Tension,	PRAKASH, A.	Water Regime of Sunflower Under Different
W74-01583 2G		Conditions of Phosphorus Nutrition, (In Rus-
BATTEON B W	Phytoplankton Nutrients and Flushing of Inlets	sian),
PAULSON, R. W.	on the Coast of Nova Scotia,	W74-01227 3F
Near Real Time Water Resources Data for	W74-01471 5B	**** * * *
River Basin Management,	PRESCOTT, G. W.	RANA, S. A.
W74-01150 4A	Seasonal Variation of Chemical Parameters in	Analysis of Sediment Sorting in Alluvial Chan-
PEART, J. A.		nels,
	Alaskan Tundra Lakes,	W74-01274 2J
Protozoa from Blue Lake, Raoul Island,	W74-01347 5B	
W74-01310 5C	PRESSWOOD, W. G.	RANKIN, J. M.
PETERS, R. H.	Comparison of Gelman and Millipore Mem-	Fluorometric Determination of Selenium in
		Water with 2,3-Diaminonaphthalene,
Storage and Processing of Water Quality Data, W74-01293	brane Filters for Enumerating Fecal Coliform	W74-01399 5A
W74-01293 7C	Bacteria,	
PHILLIPS, S. A.	W74-01554 5A	RAO, P. S.
	BREWERF OF	Physiological Ecology of Gelidiella Acerosa
Evaluation of the Bio-Disc Treatment Process	PREWETT, O. E.	(Forsskal) Feldmann et Hamel,
for Summer Camp Application,	Techniques for Measuring Light Absorption	W74-01424 5C
W74-01118 5D	Scattering, and Particle Concentrations in	
DICKIP HALB	Water,	RATTRAY, M. JR
PICKLE, HAL B.	W74-01283 7B	Effects of Friction and Surface Tide Angle of
The Impact of Water Pollution Abatement on		Incidence on the Coastal Generation of Internal
Competition and Pricing in the Alabama Textile	PRICE, N. B.	Tides,
Industry,	Particulate Metals in Waters of Sorfjord West	W74-01190 2E
W74-01101 5G	Norway,	
	W74-01528 5B	Estuarine Circulation Induced by Diffusion,
PILOT, L.		W74-01222 2L
Nitrate Reduction in Soils: Effect of Soil	PRINSENBERG, S. J.	
Moisture Tension,	Effects of Friction and Surface Tide Angle of	RAY, S. M.
W74-01583 2G	Incidence on the Coastal Generation of Internal	Microbial Flora and Level of Vibrio
	Tides,	Parahaemolyticus of Oysters (Crassostrea Vir-
PIMENTEL, D.	W74-01190 2E	ginica), Water and Sediment from Galveston
Ecological Impact of Pesticides,		Bay,
W74-01573 5C	PROBST, W.	W74-01548 5C
PEGETAL A GOVE A 34	Profile of the Vegetation of the Elburs Moun-	W 74-01340 3C
PISHNAMAZOV, A. M.	tain Range (Northern Iran), (In German),	READ, L. A. A.
System of Treating Irrigated Soil which is	W74-01385 21	Temperature Selection by Juvenile and Adult
Sown with Sugar Beets, (In Russian),		Yellow Perch (Perca Flavescens) Acclimated to
W74-01606 3F	PROCTOR, R. R. JR	24 C,
BITT C C	Some Effects of Filtration on the Determina-	W74-01353 5A
PITT, C. G.	tion of Nutrients in Fresh and Salt Water,	W 14-01333
Fluorometric Quantitation of Gallium in Biolog-	W74-01521 7B	RECHNITZ, G. A.
ical Materials at Nanogram Levels,	PROUBLE VI	Ion-Electrode Based Automatic Glucose Analy-
W74-01344 2K	PROUDMAN, J.	sis System,
PEROVADOR A A	Oscillations of Tide and Surge in an Estuary of	
PIVOVAROV, A. A.	Finite Length,	W74-01513 5A
Experimental Investigation of the Effect of Sal-	W74-01649 2L	Ion Selective Sensors,
tating Sediments on Kinematics of Flow (Ek-	BROWER C A	
sperimental'noye issledovaniye vliyaniya sal'-	PROWSE, G. A.	W74-01506 5A
tiruyushchikh nanosov na kinematiku potoka),	A Chemical Survey of the Malacca River,	REED, A.
W74-01134 2J	W74-01600 2K	
THE A COUNTY OF	OACHII W W	Study of Water Recovery and Solid Waste
PLATT, T.	QASHU, H. K.	Processing for Aerospace and Domestic Appli-
Phytoplankton Nutrients and Flushing of Inlets	Transient Movement of Water and Solutes in	cations: Volume 1 - Final Report Summary,
on the Coast of Nova Scotia,	Unsaturated Soil Systems,	W74-01280 5D
W74-01471 5B	W74-01104 2G	REICHERT, P. A.
BODAMO I	OUINN B	Promoting Environmental Quality Through
PODAMO, J.	QUINN, P.	Urban Planning and Controls,
Contribution to Biological and Chemical Study	Shigella Sonnei Isolated from Well Water,	
of the Port of Ostende, (In French),	W74-01551 5A	W74-01470 5D
W74-01384 5B	RABIN, A. C.	REID, G. H.
POLCYN, F. C.	Acridine Orange-Epifluorescence Technique	A Modified Filtration Method for the Analysis
Techniques for Measuring Light Absorption	for Counting Bacteria in Natural Waters,	of Wastewater Suspended Solids,
Scattering, and Particle Concentrations in Water,	W74-01534 5A	W74-01318 5A
	RADOSEVICH, E.	RENMAN, R. E.
W74-01283 7B	Consolidation of Irrigation Systems: Phase 1,	Study of Water Recovery and Solid Waste
POOR, G.	Engineering, Legal, and Sociological Con-	Processing for Aerospace and Domestic Appli-
Sediment Transport in a Coastal Plain Estuary,	straints and/or Facilitators,	cations: Volume 1 - Final Report Summary,
W74-01185 2L	W74-01367 3F	W74-01280 5D
L		30

AUTHOR INDEX

REYNAUD, L.

REYNAUD, L.	ROY, G. S.	SAUCIER, W. J.
Flow of a Valley Glacier with a Solid Friction	The Characteristics of the Raw Waters of	Precipitation Variability Over North Carolina,
Law,	Hasdeo River and Dhengur Nala at Korba (M.	W74-01111 2B
W74-01377 2C	P.), W74-01240 5A	SAXENA, B.
REYNOLDS, C. S.	W/4-01240	Population Dynamics of Pond Zooplankton, I.
Growth and Buoyancy of Microcystis aeru-	RUBLEVA, M. N.	Diaptomus pallidus Herrick,
ginosa Kutz. Emend. Elenkin in a Shallow	Barrier Role of Water Works Installations in	W74-01502 5C
Eutrophic Lake,	Respect to Chemical Contaminations Classified	acres v
W74-01518 5C	According to Organoleptic Properties of	SCHALK, M.
REYNOLDS, S. T.	Hazards, (In Russian), W74-01584 5D	Shoreline Processes Near Barrow, Alaska: A Comparison of the Normal and the
Die-Back in the Mixed Hardwood Forests of	W74-01584 5D	Catastrophic,
Eastern Victoria: A Preliminary Report,	RUCKS, A. C.	W74-01193 2L
W74-01251 4A	The Impact of Water Pollution Abatement on	
BUDINUPIMED C	Competition and Pricing in the Alabama Textile	SCHARFF, J. P.
RHEINHEIMER, G. Investigations on the Influence of Tides on	Industry,	Study of Chelated Mixtures of Ferric Ions with
Salinity, Content of Suspended Matter, Sedi-	W74-01101 5G	Nitrilotriacetic, Sulfo-5-Salicylic and
mentation and Bacteria Counts in the Elbe	RUSCHMEYER, O. R.	Pyrocatechol-3,5-Disulfonic Acids, (In French), W74-01440 5A
Estuary, (Untersuchungen Uber Die Einwir-	The Distribution, Composition and Biomass of	W 74-01440 3A
kung Der Tide Auf Salzgehalt, Schwebstoff-	the Crustacean Zooplankton Population in	SCHILL, G.
gehalt, Sedimentation Und Bakteriengehalt in	Western Lake Superior,	Ion Pair Partition Chromatography of Organic
Der unterelbe),	W74-01109 5C	Ammonium Compounds,
W74-01175 2L	RUSSELL, R. J.	W74-01496 5A
RHODES, K. A.	Beach Cusps,	SCHILT, A. A.
Thermodynamics of Acid-Base Equilibria. II.	W74-01180 2J	Solvent Extraction of Metal 1,10-
Ionization of m- and p-Hydrox-		Phenanthroline Complexes and Concentration
ybenzotrifluoride and the Concept of Fluorine	South American Marine Energy,	of Trace Amounts of Metal Ions Prior to Spec-
Double Bond-No Bond Resonance,	W74-01181 8A	trophotometric or Flame Photometric Deter-
W74-01226 2K	SACK, W. A.	mination,
RINKIS, G.	Evaluation of the Bio-Disc Treatment Process	W74-01354 5A
The Effect of Substrate Humidity on the	for Summer Camp Application,	COMMENT D. C.
Supply of Macroelements to Plants, (In Latvi-	W74-01118 5D	SCHMIDT, D. C. Metabolism and Biliary Excretion of Sul-
an),		fobromophthalein by Rainbow Trout (Salmo
W74-01241 3F	SALOMONSON, V. V.	Gairdneri),
BOANE M F	Water Resources, W74-01168 7C	W74-01411 5C
ROANE, M. K.	W74-01168 7C	
Two New Chytrids from the Annalachian		
Two New Chytrids from the Appalachian Highlands.	SAMET, A.	SCHNEIDER, P. A. JR
Highlands,	SAMET, A. Comparison of Gage and Radar Methods of	Hydrogeologic Characteristics of the Valley-
Highlands, W74-01305 5A	Comparison of Gage and Radar Methods of Convective Precipitation Measurement,	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South
Highlands, W74-01305 5A ROBINSON, J. W.	Comparison of Gage and Radar Methods of	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado,
Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Ab-	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South
Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B SAMSONOV, O. I.	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 4B SCHOLL, H. F.
Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Ab- sorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer,	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 4B SCHOLL, H. F. Using Computers to Analyze Continuous Data,
Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 5A	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B SAMSONOV, O. I. A Method of Forecasting the Building of a	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 4B SCHOLL, H. F.
Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 5A RODIER, J. A.	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 4B SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 7C
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 4B SCHOLL, H. F. Using Computers to Analyze Continuous Data,
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W.	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 4B SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 7C SCHROEDER, E. D.
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-Information Hydrologique Pour La Planifica-	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W. Literature on Mercury: Availability of English	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W. Literature on Mercury: Availability of English Translations,	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 5A
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-Information Hydrologique Pour La Planifica-	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 5A	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 4B SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 7C SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SA SCHULZE, E. D.
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J.	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SA SCHULZE, E. D. A New Type of Climatized Gas Exchange
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C RODRICKS, J. V.	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 5A SANDY, J. Strattgraphy and Economic Geology of the	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 4B SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 7C SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SA SCHULZE, E. D.
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L- 'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 RODRICKS, J. V. Criteria for Mycotoxin Standards,	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 2B SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Trans-
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C RODRICKS, J. V.	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia,	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Trans- piration Measurements in the Field, W74-01568 21
Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 5A RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 5A	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Trans- piration Measurements in the Field, W74-01568 21 SCHWARTZ, M. L.
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 SA ROGALSKY, J. Processing and Storage of Hydrometeorological	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 SANKARY, M. N.	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Transpiration Measurements in the Field, W74-01568 21 SCHWARTZ, M. L. Littoral Zone Tidal-Cycle Sedimentation,
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L- 'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 SA ROGALSKY, J. Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service,	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 5A SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J SANKARY, M. N. Autecology of Atriplex polycarpa from Califor-	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Trans- piration Measurements in the Field, W74-01568 21 SCHWARTZ, M. L.
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Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 5A RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 5A ROGALSKY, J. Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service, W74-01290 7C	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 5A SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J SANKARY, M. N. Autecology of Atriplex polycarpa from Califor-	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Transpiration Measurements in the Field, W74-01568 SCHWARTZ, M. L. Littoral Zone Tidal-Cycle Sedimentation, W74-01192 2J
Highlands, W74-01305 ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 SA RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L- 'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 SA ROGALSKY, J. Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service,	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 SANKARY, M. N. Autecology of Atriplex polycarpa from California, W74-01259 SARIG, S.	Hydrogeologic Characteristics of the Valley-Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Transpiration Measurements in the Field, W74-01568 SCHWARTZ, M. L. Littoral Zone Tidal-Cycle Sedimentation, W74-01192 SEARS, J. R. Sublittoral Benthic Marine Algae of Southern Cape Cod and Adjacent Islands: Pseu-
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Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 5A RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-Tinformation Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 5A ROGALSKY, J. Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service, W74-01290 7C ROLLER, P. P. N-Nitrosation by Nitrite Ion in Neutral and Basic Medium, W74-01328 5B	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 SANKARY, M. N. Autecology of Atriplex polycarpa from California, W74-01259 SARIG, S. Fisheries and Fish Culture in Israel in 1971, W74-01570 6B	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Transpiration Measurements in the Field, W74-01568 SCHWARTZ, M. L. Littoral Zone Tidal-Cycle Sedimentation, W74-01192 SEARS, J. R. Sublittoral Benthic Marine Algae of Southern Cape Cod and Adjacent Islands: Pseudolithoderma Paradoxum Sp. Nov. (Ralf-
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Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 5A RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-Tinformation Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 5A ROGALSKY, J. Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service, W74-01290 7C ROLLER, P. P. N-Nitrosation by Nitrite Ion in Neutral and Basic Medium, W74-01328 5B	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 SANKARY, M. N. Autecology of Atriplex polycarpa from California, W74-01259 SARIG, S. Fisheries and Fish Culture in Israel in 1971, W74-01570 6B	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Transpiration Measurements in the Field, W74-01568 SCHWARTZ, M. L. Littoral Zone Tidal-Cycle Sedimentation, W74-01192 SEARS, J. R. Sublittoral Benthic Marine Algae of Southern Cape Cod and Adjacent Islands: Pseudolithoderma Paradoxum Sp. Nov. (Ralfsiaceae, Ectocarpales), W74-01350 SA
Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 5A RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 5A ROGALSKY, J. Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service, W74-01290 7C ROLLER, P. P. N-Nitrosation by Nitrite Ion in Neutral and Basic Medium, W74-01328 5B ROSEN, H. H. Improved Waste Disposal Unit, W74-01284 5D	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J SANKARY, M. N. Autecology of Atriplex polycarpa from California, W74-01259 SARIG, S. Fisheries and Fish Culture in Israel in 1971, W74-01570 SARKKA, J. The Bottom Macrofauna of the Oligotrophic	Hydrogeologic Characteristics of the Valley- Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Transpiration Measurements in the Field, W74-01568 SCHWARTZ, M. L. Littoral Zone Tidal-Cycle Sedimentation, W74-01192 SEARS, J. R. Sublittoral Benthic Marine Algae of Southern Cape Cod and Adjacent Islands: Pseudolithoderma Paradoxum Sp. Nov. (Ralfsiaceae, Ectocarpales), W74-01350 SEDRANSK, J. Estimation of Domain Means Using Two-Phase Sampling,
Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 5A RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 5A ROGALSKY, J. Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service, W74-01290 7C ROLLER, P. P. N-Nitrosation by Nitrite Ion in Neutral and Basic Medium, W74-01328 5B ROSEN, H. H. Improved Waste Disposal Unit, W74-01284 5D ROSSINSKIY, K. I.	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 2J SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 2J SANKARY, M. N. Autecology of Atriplex polycarpa from California, W74-01259 SARIG, S. Fisheries and Fish Culture in Israel in 1971, W74-01570 SARKKA, J. The Bottom Macrofauna of the Oligotrophic Lake Konnevesi, Finland, W74-01287 5C	Hydrogeologic Characteristics of the Valley-Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 4B SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 7C SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 5A SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Transpiration Measurements in the Field, W74-0158 21 SCHWARTZ, M. L. Littoral Zone Tidal-Cycle Sedimentation, W74-01192 2J SEARS, J. R. Sublittoral Benthic Marine Algae of Southern Cape Cod and Adjacent Islands: Pseudolithoderma Paradoxum Sp. Nov. (Ralfsiaceae, Ectocarpales), W74-01350 5A SEDRANSK, J. Estimation of Domain Means Using Two-Phase
Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 5A RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 5A ROGALSKY, J. Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service, W74-01290 7C ROLLER, P. P. N-Nitrosation by Nitrite Ion in Neutral and Basic Medium, W74-01328 5B ROSEN, H. H. Improved Waste Disposal Unit, W74-01284 5D ROSSINSKIY, K. I. Experimental Investigation of the Effect of Sal-	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 SANKARY, M. N. Autecology of Atriplex polycarpa from California, W74-01259 SARIG, S. Fisheries and Fish Culture in Israel in 1971, W74-01570 SARKKA, J. The Bottom Macrofauna of the Oligotrophic Lake Konnevesi, Finland, W74-01287 SASTRI, V. S.	Hydrogeologic Characteristics of the Valley-Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Transpiration Measurements in the Field, W74-01568 SCHWARTZ, M. L. Littoral Zone Tidal-Cycle Sedimentation, W74-01192 SEARS, J. R. Sublittoral Benthic Marine Algae of Southern Cape Cod and Adjacent Islands: Pseudolithoderma Paradoxum Sp. Nov. (Ralfsiaceae, Ectocarpales), W74-01350 SEDRANSK, J. Estimation of Domain Means Using Two-Phase Sampling, W74-01498
Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 5A RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-'Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 5A ROGALSKY, J. Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service, W74-01290 7C ROLLER, P. P. N-Nitrosation by Nitrite Ion in Neutral and Basic Medium, W74-01328 5B ROSEN, H. H. Improved Waste Disposal Unit, W74-01284 5D ROSSINSKIY, K. I. Experimental Investigation of the Effect of Saltating Sediments on Kinematics of Flow (Ek-	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 SANKARY, M. N. Autecology of Atriplex polycarpa from California, W74-01259 SARIG, S. Fisheries and Fish Culture in Israel in 1971, W74-01570 SARKKA, J. The Bottom Macrofauna of the Oligotrophic Lake Konnevesi, Finland, W74-01287 SASTI, V. S. Ligand Photooxidation in Copper (II) Com-	Hydrogeologic Characteristics of the Valley-Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Transpiration Measurements in the Field, W74-01568 SCHWARTZ, M. L. Littoral Zone Tidal-Cycle Sedimentation, W74-01192 SEARS, J. R. Sublittoral Benthic Marine Algae of Southern Cape Cod and Adjacent Islands: Pseudolithoderma Paradoxum Sp. Nov. (Ralfsiaceae, Ectocarpales), W74-01350 SEDRANSK, J. Estimation of Domain Means Using Two-Phase Sampling, W74-01498 SEITZ, W. R.
Highlands, W74-01305 5A ROBINSON, J. W. The Determination of Cadmium by Atomic Absorption in Air, Water, Sea Water and Urine with a R.F. Carbon Bed Atomizer, W74-01441 5A RODIER, J. A. Hydrological Information for the Planning of Water Resources in Developing Countries (L-Information Hydrologique Pour La Planification des Resources Hydrauliques Dans Les Pays en Voie de Developpement), W74-01623 7C RODRICKS, J. V. Criteria for Mycotoxin Standards, W74-01414 5A ROGALSKY, J. Processing and Storage of Hydrometeorological Data in the Atmospheric Environment Service, W74-01290 7C ROLLER, P. P. N-Nitrosation by Nitrite Ion in Neutral and Basic Medium, W74-01328 5B ROSEN, H. H. Improved Waste Disposal Unit, W74-01284 5D ROSSINSKIY, K. I. Experimental Investigation of the Effect of Sal-	Comparison of Gage and Radar Methods of Convective Precipitation Measurement, W74-01149 SAMSONOV, O. I. A Method of Forecasting the Building of a River Bar (Metod prognoza pereformirovaniy rechnogo bara), W74-01388 SANDERS, W. Literature on Mercury: Availability of English Translations, W74-01323 SANDY, J. Stratigraphy and Economic Geology of the Coastal Plain of the Central Savannah River Area, Georgia, W74-01122 SANKARY, M. N. Autecology of Atriplex polycarpa from California, W74-01259 SARIG, S. Fisheries and Fish Culture in Israel in 1971, W74-01570 SARKKA, J. The Bottom Macrofauna of the Oligotrophic Lake Konnevesi, Finland, W74-01287 SASTRI, V. S.	Hydrogeologic Characteristics of the Valley-Fill Aquifer in the Weldona Reach of the South Platte River Valley, Colorado, W74-01142 SCHOLL, H. F. Using Computers to Analyze Continuous Data, W74-01520 SCHROEDER, E. D. Characterization and Treatability of Pomace Stillage, W74-01325 SCHULZE, E. D. A New Type of Climatized Gas Exchange Chamber for Net Photosynthesis and Transpiration Measurements in the Field, W74-01568 SCHWARTZ, M. L. Littoral Zone Tidal-Cycle Sedimentation, W74-01192 SEARS, J. R. Sublittoral Benthic Marine Algae of Southern Cape Cod and Adjacent Islands: Pseudolithoderma Paradoxum Sp. Nov. (Ralfsiaceae, Ectocarpales), W74-01350 SEDRANSK, J. Estimation of Domain Means Using Two-Phase Sampling, W74-01498

5A

SEKI, H.	SHINDALA, A.	SIMMONS, W. J.
Silica Gel Medium for Enumeration of Petrole-	Utilization of Remote Sensing in River Basin	Determination of Low Concentrations of
umlytic Microorganisms in the Marine Environ-	Studies,	Cobalt in Plant Material by Atomic Absorption
ment,	W74-01154 5A	Spectrophotometry,
W74-01532 5A		W74-01356 2K
	SHKOLNIK, G. M.	
SELTZER, E. J.	The Determination of Thallium in Urine and	SIMONS, D. B.
A Systematic Study of the Variables Involved	Plasma by Delves Cup Atomic Absorption,	Analysis of Sediment Sorting in Alluvial Chan-
in the Reverse-Phase Thin-Layer Chromatog-	W74-01314 5A	nels,
raphy of Oxyethylated Alkyl Sulfate Surfac-	WATER	W74-01274 2J
tants.	SHORE, B. L.	
W74-01358 5A		SKAKAL'SKIY, B. G.
	Versatile Computer Generated Variable Ac-	Urbanization and Its Effects on Regimen and
SENN, H.	celerating Voltage Circuit for Magnetically	Quality of Surface Waters (Urbanizatsiya i
Comparison of Gage and Radar Methods of	Scanned Mass Spectrometers. Use for Assays	yeye vliyaniye na rezhim i kachestvo poverkh-
Convective Precipitation Measurement,	in the Picogram Range and for Assays of Stable	nostnykh vod),
W74-01149 2B	Isotope Tracers,	W74-01139 4C
	W74-01335 2K	#74-01139
SEPPALA, M.		SKATULA, L.
On the Formation of Small Marginal Lakes on	SHORT, C. C.	Protective Function of the Forest in Areas of
the Juneau Icefield, South-Eastern Alaska,	Prevention of Selenium Interference with Mea-	Waterwork Reservoirs, (In Czech),
U.S.A.,	surement of Phosphate as its Molybdenum (V-	W74-01582 4A
W74-01379 2C	VI) Complex,	W 14-01302 4A
	W74-01345 5A	SKEI, J. M.
SERRUYA, C.	•	Particulate Metals in Waters of Sorfjord West
Metalimnic Layer in Lake Kinneret, Israel,	SHORT, N. M.	The state of the s
W74-01598 5C	Mineral Resources, Geological Structure and	Norway, W74-01528 5B
	Landform Surveys,	# 14-01320 3B
SHALAEVA, N. M.	W74-01166 7C	SKOGERBOE, R. K.
Invertebrate Fauna of Waters of the Station	,,,	Analytical Applications of Pulsed Voltammetric
'Agapa' (Western Taimyr), (In Russian),	SHUBINSKI, R. P.	
W74-01264 2I	Computer Simulation of Estuarial Networks,	Stripping at Thin Film Mercury Electrodes,
		W74-01514 5A
SHARAR, M. S.	W74-01197 2L	SKOCESSOR A
Water Requirements of Wheat and Cotton on a	CHINAN M C	SKOGERBOE, V.
High Water Table Soil Under Arid Conditions,	SHUMAN, M. S.	Consolidation of Irrigation Systems: Phase 1,
W74-01595 3F	Chemical Constants of Metal Complexes from	Engineering, Legal, and Sociological Con-
	a Complexometric Titration Followed with	straints and/or Facilitators,
SHARPEE, K. W.	Anodic Stripping Voltammetry,	W74-01367 3F
2,4-dichlorophenoxyacetate metabolism by	W74-01332 5A	
Arthrobacter sp.: Accumulation of a Chlorobu-		SKORODUMOV, A. S.
tenolide,	SHUVAL, H. I.	Productivity of Cereal Crops on Eroded Cher-
W74-01550 5B	Epidemiological and Toxicological Aspects of	nozems Against Both Non-Fertilized and Fertil-
	Nitrates and Nitrites in the Environment,	ized Backgrounds, (In Russian),
SHEN, M. C.	W74-01386 5C	W74-01557 3F
Long Surf,		
W74-01203 2E	SICK, W. J.	SLEVIN, P. J.
	Determination of the Total Storage Capacity of	The Determination of Cadmium by Atomic Ab-
SHERMAN, W. R.	the Cretaceous Sandstone Aquifers in South	sorption in Air, Water, Sea Water and Urine
Versatile Computer Generated Variable Ac-	Dakota,	with a R.F. Carbon Bed Atomizer,
celerating Voltage Circuit for Magnetically	W74-01114 2F	W74-01441 5A
Scanned Mass Spectrometers. Use for Assays		
in the Picogram Range and for Assays of Stable	SIGGIA, S.	SMALLWOOD, C. JR
Isotope Tracers,	Atomic Absorption Method for Determining	Wastewater Characterization of Sweet Potato
W74-01335 2K	Micromolar Quantities of Aliphatic Secondary	Processing,
	Amines,	W74-01324 5A
SHERWANI, J. K.	W74-01492 5A	
Simulation Models for Water-Resource	JA	SMEYERS-VERBEKE, J.
Systems: Their Utility in Measuring Physical	SILBERGELD, E. K.	A Comparison of Fast Destruction Methods for
and Economic Effects of Weather Forecasting	Dieldrin. Effects of Chronic Sublethal Expo-	the Determination of Trace Metals in Biological
and Weather Modification: Summary Report,	sure on Adaptation to Thermal Stress in Fresh-	Materials,
W74-01463 3B	water Fish.	W74-01317 5A
	W74-01408 5C	
SHIKLOMANOV, I. A.	W/4-01400 SC	SMITH, D. P. JR
Surface-Water Resources of the USSR and	SILVERSTEIN, I. R.	Thermodynamics of Acid-Base Equilibria. II.
Their Change Resulting from Human Economic	Water Pollution in Louisiana: An Attempt at	Ionization of m- and p-Hydrox-
Activity (Resursy poverkhnostnykh vod SSSR i		ybenzotrifluoride and the Concept of Fluorine
ikh izmeneniye pod vliyaniyem khozyaystven-	Control,	Double Bond-No Bond Resonance,
noy deyatel'nosti),	W74-01451 5G	W74-01226 2K
W74-01133 4A	SIMCO, B.	01/1977 D. W
		SMITH, D. V.
SHIMP, N. F.	Monitoring Channel Catfish Use of a Demand	A Hybrid Model for Irrigation Planning Using
Chlorinated Hydrocarbon Insecticides in Sedi-	Feeder,	Chance Constrained Programming and
ments of Southern Lake Michigan,	W74-01237 8I	Hydrologic Simulation,
W74-01397 5B	ananowa a	W74-01488 4B
	SIMEONI, G.	
Isotopic Composition of Helium in Thermal	Study of the Speed of Water Circulation in a	SMITH, F. A.
Springs of Iceland (Izotopnyy sostav geliya ter-	Water-Bearing Limestone Deposit by Tracing	Effects of Protozoa on the Fate of Particulate
mal'nykh istochnikov Islandii),	Tests (La Serriere River Basin/NE),	Carbon,
W74-01396 2K	W74-01563 2F	W74-01117 5C

SMITH, L.	ST, W.	Chlorinated Hydrocarbon Pesticides in the
An Oxygen Electrode Microrespirometer,	Comparison of the Snow Resistograph with the	Presence of Polychlorinated Biphenyls,
W74-01419 5A	Ram Penetrometer,	W74-01493 5A
SMITH, L. L. JR	W74-01381 2C	SUKHODOL'SKAYA, N. K.
Swimming Endurance and Resistance to	STAFFORD, D. A.	Spring Flooding and Fauna (In Russian),
Copper and Malathion of Bluegills Treated by	The Role of Micro-Organisms in Waste Tip-	W74-01261 2I
Long-Term Exposure to Sublethal Levels of	Lagoon Systems Purifying Coke-Oven Ef-	
Hydrogen Sulfide,	fluents,	SWARTZENDRUBER, D.
W74-01579 5C	W74-01647 5D	Effect of Portland Cement on Soil Aggregation
		and Hydraulic Properties,
SMITH, M. J.	STAHR, H. M.	W74-01576 2G
Copper Micronutrient Requirement for Algae,	Determination of Chlorinated Pesticides in	SWEAZY, R. M.
W74-01398 5C	Whole Blood, W74-01417 5A	Recreational Reuse of Municipal Wastewater,
The Importance of Chelating Agents in Natural	W/4-0141/	W74-01103 5D
Waters and Wastewaters,	STEFUREAC, T. I.	
W74-01326 5B	Bryocenological Research in Some Areas of the	SWINTH, R. L.
	Iron Gate of the Danube, (In Rumanian),	Simulation of Water Recreation Users' Deci-
SMITH, R. J.	W74-01453 2I	sions,
Relationships of Indicator and Pathogenic Bac-	AMERICA .	W74-01464 6D
teria in Stream Waters, W74-01645 5B	STEINE, I.	SWISHER, R. D.
W74-01645 5B	Number and Size of Drifting Nymphs of Ephemeroptera, Chironomidae, and Simulidae	Biodegradation of O-Benzyl-P-Chlorophenol,
SMREK, A. L.	by Day and Night in the River Stranda,	W74-01552 5B
Modified Delves Cup Atomic Absorption	Western Norway,	
Determination of Lead in Blood,	W74-01230 2I	SZEKIELDA, K. H.
W74-01415 5A	1174 01230	Investigations on the Influence of Tides on
	STETAK, T.	Salinity, Content of Suspended Matter, Sedi-
SNEED, R. E.	An Improved Method of Cell Enumeration for	mentation and Bacteria Counts in the Elbe
Agricultural Water Demand in North Carolina:	Filamentous Algae and Bacteria,	Estuary, (Untersuchungen Uber Die Einwir-
Phases I and II,	W74-01421 5A	kung Der Tide Auf Salzgehalt, Schwebstoff-
W74-01112 6D	STOBER, H. C.	gehalt, Sedimentation Und Bakteriengehalt in
SOBSEY, M. D.	Gas-Solid Chromatography on Macroreticular	Der unterelbe), W74-01175
Virus Concentration from Sewage,	Cation Exchange Resins,	W/4-011/5
W74-01533 5D	W74-01495 5A	TACKETT, D.
		Monitoring Channel Catfish Use of a Demand
SOKOLOV, A. A.	STOEFFLER, R. L.	Feeder,
Surface-Water Resources of the USSR and	Vortex Concept for Separating Oil from Water,	W74-01237 8I
Their Change Resulting from Human Economic	W74-01148 5G	TAIDA W
Activity (Resursy poverkhnostnykh vod SSSR i	STRAHLER, A. N.	TAIRA, K. Experimental Study of Wave Reflection by a
ikh izmeneniye pod vliyaniyem khozyaystven- noy deyatel'nosti),	Tidal Cycle of Changes in an Equilibrium	Sloping Beach,
W74-01133 4A	Beach, Sandy Hook, New Jersey,	W74-01223 2E
	W74-01198 2L	
SOKOLOVA, V. A.		TAKASHIMA, F.
Zooplankton in Kolyma-Indigirka Lakes (In	STREET, R. L.	Distribution of (C-14) PCBs in Carp,
Russian),	Observations and Experiments on Solitary	W74-01530 5C
W74-01341 2H	Wave Deformation,	TAN, Y. T.
SOMOV, N. V.	W74-01215 8B	A Chemical Survey of the Malacca River,
International Scientific and Technical Coopera-	STRELETSKAYA, E. A.	W74-01600 2K
tion in the Field of Water Problems (Mezhdu-	Oxbow Cut-Off Bog Lake Zooplankton of the	
narodnoye nauchno-tekhnicheskoye sotrud-	Kolyma Basin (In Russian),	TANNER, W. F.
nichestvo v oblasti vodnykh problem),	W74-01265 2H	The Equilibrium Beach,
W74-01138 6E		W74-01195 2J
COMPLE B C	STRETZ, P. E.	TANOPU M P
SOWELL, R. S. Agricultural Water Demand in North Carolina:	Determination of Chlorinated Pesticides in Whole Blood,	TANSEY, M. R. Algal Excretion of C-14-Labeled Compounds
Phases I and II,	W74-01417 5A	and Microbial Interactions in Cyanidium cal-
W74-01112 6D	W/4-0141/	darium Mats,
W/4-01112	STRILAEFF, P. W.	W74-01510 5C
SPASOV, V. P.	Single-Velocity Method in Measuring	
The Action of Mineral Fertilization on Pasture	Discharge,	TAVENER, G. F.
Herbage, Irrigated with Sewage, (In Russian),	W74-01161 2C	Stability and Reach Length in Water Surface
W74-01559 5D	STUART, D. G.	Profile Determination,
SPECHT, R. L.	Survival of Coliform Bacteria in Natural	W74-01152 2E
Water Use by Perennial Evergreen Plant Com-	Waters: Field and Laboratory Studies with	TAYLOR, S. A.
munities in Australia and Papua New Guinea,	Membrane-Filter Chambers,	Physical Edaphology. The Physics of Irrigated
W74-01634 2D	W74-01250 5B	and Nonirrigated Soils,
		W74-01572 2G
SREENIVASA, M. R.	STUEBER, A. M.	MEADE 1 D
Diatom Flora of the Grand River, Ontario,	Sr-87/Sr-86 Ratios and Total Strontium Con-	TEARE, I. D.
Canada, W74-01311 5A	centrations in Surface Waters of the Scioto River Drainage Basin, Ohio.	Stomatal-Diffusion Resistance and Water
W74-01311 5A	W74-01516 5B	Potential of Soybean and Sorghum Leaves, W74-01605
ST, S.		
Reservoir Mechanism in an Aquifer of Arbitra-	8U, G. C. C.	TEEPLE, C. R.
ry Boundary Shape, W74-01129	Analytical Methodology for Bioactive Com-	Don't Forget D/A Converter Tempco,
W (adl1179 2E	nounds Photochemically Assisted Analysis of	W74_01507

TERENT'EVA, I. N. Water Regime of Sunflower Under Different Conditions of Phosphorus Nutrition, (In Rus-	TURNER, J. F. JR Hydrograph Simulation Models of the Hill- sborough and Alafia Rivers, Florida: A Prelimi-	VELDKAMP, H. Rhodopseudomonas Sulfidophila, Nov. Spec., A New Species of the Purple Nonsulfur Bac-
sian), W74-01227 3F	nary Report, W74-01611 4A	teria, W74-01544 5B
TEYS, R. V.	TWEDT, R. M.	VENTILLA, R. J.
Use of Isotopic Methods to Determine Present Rates of Snow Accumulation in Antarctica (Ispol'zovaniye izotopnykh metodov dlya opredeleniya sovremennoy skorsti nakopleniya	Relationships of Indicator and Pathogenic Bac- teria in Stream Waters, W74-01645 5B	Growth Rates of Sediment-Living Marine Protozoan as a Toxicity Indicator for Heavy Metals,
snega v Antarktide), W74-01393 2C	TYAGI, A. K.	W74-01529 5A
THOMAS, D. L.	Transient Movement of Water and Solutes in Unsaturated Soil Systems, W74-01104 2G	VETSHTEYN, V. YE. Isotopic Composition of Oxygen and Hydrogen in Sulfide Waters of the Sochi-Adler Artesian
Electrophoretic and Immunological Analyses of Seven Chlorosarcinacean Algae, W74-01426 5A	TYUTKOV, O. V.	Basin (Izotopnyy sostav kisloroda i vodorada sul'fidnykh vod Sochi-Adlerskogo artezian-
THOMPSON, C. A. JR	Water Resources of the Ural Area and Basic Problems in Their Complex Use (Vodnyye re-	skogo basseyna), W74-01394 2K
Microbial Flora and Level of Vibrio Parahaemolyticus of Oysters (Crassostrea Vir- ginica), Water and Sediment from Galveston	sursy Urala i osnovnyye problemy ikh kom- pleksnogo ispol'zovaniya), W74-01135 3E	VILENSKIY, V. D. Use of Isotopic Methods to Determine Present
Bay,		Rates of Snow Accumulation in Antarctica
W74-01548 5C TICKNER, E. G.	UECKERT, D. N. Effects of Leaf-Footed Bugs on Mesquite	(Ispol'zovaniye izotopnykh metodov dlya opredeleniya sovremennoy skorsti nakopleniya
Effects of Reefs and Bottom Slopes on Wind Set-Up in Shallow Water,	Reproduction, W74-01638 4A	snega v Antarktide), W74-01393 2C
W74-01182 2J	ULRICH, B.	VLACHOS, C.
TISHCHENKO, A. P. Geophysical Measurements of the Thickness of	Desorption and Dissolution of Salts from Soils as a Function of Soil Water Ratio, W74-01604 2G	Consolidation of Irrigation Systems: Phase 1, Engineering, Legal, and Sociological Con- straints and/or Facilitators,
the Malyy Azau Glacier (Geofizicheskiye opredeleniya moshchnosti lednika Malyy	USHAKOVA, L. A.	W74-01367 3F
Azau), W74-01390 2C	Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye	VLASENKO, N. B. Concentrations of Dissolved Forms of Fe, Mn,
TOLLEFSON, J. O.	opredeleniya moshchnosti lednika Malyy Azau),	and Cu in Marine Pore Waters of the Atlantic Basin (Kontsentratsii rastvorennykh form Fe,
Simulation of Water Recreation Users' Decisions,	W74-01390 2C	Mn, i Cu v morskikh, porovykh vodakh bas-
W74-01464 6D	VADAS, R. L.	seyna Atlanticheskogo okeana), W74-01392 2K
TORRES, G. JR Oxnard Basin Experimental Extraction-Type Barrier.	Salinity Adaptation by Dunaliella Tertiolecta. I. Increases in Carbonic Anhydrase Activity and Evidence for a Light-Dependent Na (Plus)/H	VOROB'EV, V. I. Substantiation of the Maximum Permissible
W74-01289 8B	(Plus) Exchange, W74-01427 5C	Concentration of ANP-2 Compound in Water
TRAFFORD, G. H. Multidisciplinary/Regional Resource Surveys,	VAN DER KOOLJ, D.	Bodies, (In Russian), W74-01581 5G
W74-01171 7B	Investigations on the Sheathed Bacterium	VOSKRESENSKIY, K. P.
TREASURE, W. Effect of Spoil Disposal on Benthic Inver-	Haliscomenobacter hydrossis Gen.n., Sp.n., Isolated from Activated Sludge,	Surface-Water Resources of the USSR and Their Change Resulting from Human Economic
tebrates, W74-01420 5C	W74-01539 5B VAN DER VLIES, A. W.	Activity (Resursy poverkhnostnykh vod SSSR i ikh izmeneniye pod vliyaniyem khozyaystven-
TRIMM, J. R.	Investigations on the Sheathed Bacterium	noy deyatel'nosti), W74-01133 4A
Separation of Polyphosphates by Paper Chro- matography with a New Solvent,	Haliscomenobacter hydrossis Gen.n., Sp.n., Isolated from Activated Sludge,	VOTH, V.
W74-01366 5A	W74-01539 5B	Effect of Flooding on the Twospotted Spider Mite and its predators on Strawberry in
TRIPATHI, N. C. Effect of Moisture Stress on Soybean (Glycine max (L.) Merr.),	VAN VEEN, W. L. Bacteriology of Activated Sludge, in Particular the Filamentous Bacteria,	Southern California, W74-01243 3F
W74-01599 3F	W74-01540 5B	WALLIS, C. Virus Concentration from Sewage.
TSUDA, R. T. Algal Succession on Artificial Reefs in a	Investigations on the Sheathed Bacterium Haliscomenobacter hydrossis Gen.n., Sp.n.,	W74-01533 5D
Marine Lagoon Environment in Guam, W74-01429 5C	Isolated from Activated Sludge, W74-01539 5B	WALLWORK, J. A. Distribution Patterns and Population Dyanmics
TSYGANOVA, K. N.	VANDERZANT, C.	of the Micro-Arthropods of a Desert Soil in Southern California,
Regional Estimate of Brackish and Saline- Groundwater Yield (Regional naya otsenka	Microbial Flora and Level of Vibrio Parahaemolyticus of Oysters (Crassostrea Vir-	W74-01635 21
ekspluatatsionnykh resursov solonovatykh i solenykh podzemnykh vod),	ginica), Water and Sediment from Galveston	WALTER, L. S. Environment Surveys,
W74-01137 4B	W74-01548 5C	W74-01167 5A
TULLY, J. P. On Structure, Entrainment, and Transport in	VANWORMER, D.	WARD, F. J.
Estuarine Embayments, W74-01178 2L	Seismic Evidence for Glacier Motion, W74-01378 2C	Some Sources of Error in the 14C Method for Estimating Primary Productivity and Their

AUTHOR INDEX

WARD, F. J.

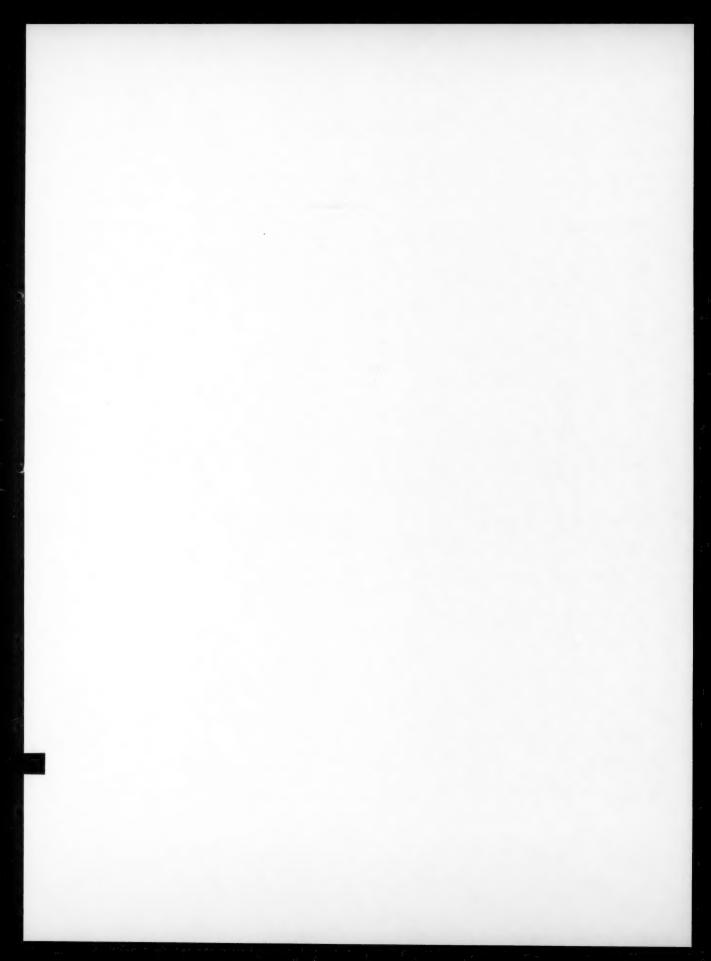
Relationship to Light Intensity During Incuba-	WELLS, D. R. Beach Equilibrium and Second-Order Wave	WILLIAMS, R. A. Drawdown at Time-Dependent Flowrate,
W74-01217 2H	Theory,	W74-01155 2F
WARNER, K.	W74-01201 2E	WILLIAMS, V. P.
Further Studies of Fish Predation on Salmon	WELLS, E. E. JR	Distribution of Alkyl Arsenicals in Model
Stocked in Maine Lakes,	Automated Rapid Scan Instrument for Spec-	Ecosystem,
W74-01603 2H	troelectrochemistry in the Visible Region,	W74-01409 5C
WARRICK, A. W.	W74-01331 2K	WINGHAM, M.
Transient Movement of Water and Solutes in	WEN, J. W.	Ligand Photooxidation in Copper (II) Com-
Unsaturated Soil Systems,	Critical Study of the APCD-MIBK Extraction	plexes of Nitrilotriacetic Acid. Implications for
W74-01104 2G	System for Atomic Absorption,	Natural Waters,
	W74-01329 5A	W74-01400 5B
WATANABE, T.		WINN IN T. ID
Distribution of (C-14) PCBs in Carp,	WEST, A. C.	WINN, W. T. JR Recreational Reuse of Municipal Wastewater,
W74-01530 5C	Lateral Diffusion Interferences in Flame Atomic Absorption and Emission Spec-	W74-01103 5D
WATSON, D. J.	trometry.	117-01103
Effects of Shading and of Seasonal Differences	W74-01342 2K	WOLCOTT, D. K.
in Weathering on the Growth, Sugar Content		The Determination of Cadmium by Atomic Ab-
and Sugar Yield of Sugar Beet Crops,	WEST, T. S.	sorption in Air, Water, Sea Water and Urine
W74-01229 3F	Investigation of Spectral Overlap of the Neon	with a R.F. Carbon Bed Atomizer, W74-01441 5A
WEAVER, J. W.	359.352-nm and Chromium 359.349-nm Spectral	W/4-01441
Practical Methods for Derivatizing and Analyz-	Lines in Atomic Absorption and Atomic Fluorescence Spectrometry of Chromium,	WONG, K. M.
ing Bacterial Metabolites with a Modified Auto-	W74-01337 2K	Concentrations of Plutonium, Cobalt, and
matic Injector and Gas Chromatograph,		Silver Radionuclides in Selected Pacific
W74-01336 5A	WESTERBY, R. J.	Seaweeds,
SUPER T	Determination of Meleic Hydrazide Residues in	W74-01297
WEBB, J.	Tobacco and Vegetables,	WONG, P. T. S.
Emission Spectrometric Determination of Trace Metals in Biological Tissues,	W74-01418 5A	Mechanism of NTA Degradation By a Bacterial
W74-01546 5A	WHIPPLE, W. JR	Mutant,
	Mobile Oxygen Dispersion Craft,	W74-01515 5B
WEBER, A. H.	W74-01232 5G	Studies of Rapid NTA-Utilizing Bacterial Mu-
Precipitation Variability Over North Carolina,		tant,
W74-01111 2B	WHITE, E. R.	W74-01348 5B
WEBER, E. W.	Thermal and Base-Catalyzed Hydrolysis Products of the Systemic Fungicide, Benomyl,	
River Basin Planning in the United States,	W74-01504 Systemic Fungicide, Benomyl,	WOOD, F. A.
W74-01472 6B	W. 1 01501	The Relationship Between Maple Canker In-
	WHITE, W. R.	cidence and Precipitation, W74-01602 2I
WEBER, L. J.	Sediment Transport: New Approach and Anal-	11 1-01002
Metabolism and Biliary Excretion of Sul-	ysis, W74-01279 2J	WOODIS, T. C. JR
fobromophthalein by Rainbow Trout (Salmo Gairdneri),	W74-01279 2J	Separation of Polyphosphates by Paper Chro-
W74-01411 5C	WHITNEY, P. J.	matography with a New Solvent,
	The Carbohydrate and Water Balance of Beans	W74-01366 5A
WEEKS, W. F.	(Vicia faba) Attacked by Broomrape	WOODLEY, W. L.
Icebergs as a Fresh-Water Source: An Ap-	(Orobanche crenata),	Comparison of Gage and Radar Methods of
praisal, W74-01375 2C	W74-01575 3F	Convective Precipitation Measurement,
W74-01375 2C	WICKSTROM, C. E.	W74-01149 2B
WEIDENSAUL, T. C.	Thermophilic Ostracod: Aquatic Metazoan with	WOODRUFF, K. D.
The Relationship Between Maple Canker In-	the Highest Known Temperature Tolerance,	Prediction of Well Development Possibilities in
cidence and Precipitation,	W74-01327 5C	Delaware by means of Calibrated Gamma-Ray
W74-01602 2I	WIECLAWSKI, F.	Logs,
WEIGAND, J. G.	Investigations on the Changes in the Content of	W74-01106 4B
Effects of Friction and Surface Tide Angle of	Heavy Metals in Lake Waters of the Masurian	WOODWARD, G. P. JR
Incidence on the Coastal Generation of Internal	Lake District,	Chemical Constants of Metal Complexes from
Tides,	W74-01221 5B	a Complexometric Titration Followed with
W74-01190 2E	WIEDERHOLM, T.	Anodic Stripping Voltammetry,
WEISS, H. V.	Bottom Fauna as an Indicator of Water Quality	W74-01332 5A
Simultaneous Determination of Manganese,	in Sweden's Large Lakes (Lakes Malaren, Vat-	WOOLSON, E. A.
Copper, Arsenic, Cadmium, Antimony and	tern and Vanern),	Distribution of Alkyl Arsenicals in Model
Mercury in Glacial Ice by Radioactivation,	W74-01531 5B	Ecosystem,
W74-01361 5A	WILCE D. T.	W74-01409 5C
WELCH, E. B.	WILCE, R. T. Sublittoral Benthic Marine Algae of Southern	VAPONITZ C I
The Relations of Periphytic and Planktonic	Sublittoral Benthic Marine Algae of Southern Cape Cod and Adjacent Islands: Pseu-	YAKOWITZ, S. J. A Stochastic Model of Streamflow Based on
Algal Growth in an Estuary to Hydrographic	dolithoderma Paradoxum Sp. Nov. (Ralf-	the Theory of Functions of Markov Processes,
Factors,	siaceae, Ectocarpales),	W74-01123 2E
W74-01571 5C	W74-01350 5A	_
WPITC D M	WILDY B O	YAMAMOTO, T.
WELLS, D. M. Recreational Reuse of Municipal Wastewater,	WILEN, B. O. A Reliable and Inexpensive Soil Frost Gage,	Extraction-Photometric Determination of Uranium (IV) with Chlorophosphonazo-III.
W74-01103 5D	W74-01574 2G	W74-01364 5A
35	20	JA.

HANG B. B.
YANG, R. T. Quantitative Analysis of Aqueous Nitrite/Nitrate Solutions by Infrared Internal Reflectance Spectrometry,
W74-01402 2K
YATES, P. J. Oxnard Basin Experimental Extraction-Type
Barrier, W74-01289 8B
YEH, W. WG.
Linear Programming and Channel Flow Identification, W74-01277 8B
YEMEL'YANOV, V. V.
Use of Isotopic Methods to Determine Present
Rates of Snow Accumulation in Antarctica
(Ispol'zovaniye izotopnykh metodov dlya
opredeleniya sovremennoy skorsti nakopleniya snega v Antarktide),
W74-01393 2C
YEMEL'YANOV, YE. M.
Concentrations of Dissolved Forms of Fe, Mn,
and Cu in Marine Pore Waters of the Atlantic
Basin (Kontsentratsii rastvorennykh form Fe, Mn, i Cu v morskikh, porovykh vodakh bas-
seyna Atlanticheskogo okeana),
W74-01392 2K
YOKLEY, P. JR
Freshwater Mussel Ecology, Kentucky Lake,
Tennessee, May 1, 1969-June 15, 1972, W74-01641 5C
YOSHIDA, T. Distribution of (C-14) PCBs in Carp,
W74-01530 5C
YOUNG, H. Y.
Microdetermination of Chloro-S-Triazines in
Soil by Gas-Liquid Chromatography with Nickel Electron Capture or Electrolytic Con-
ductivity Detection,
W74-01304 5A
YOUNG, J. W.
Simple Inexpensive Freeze-Drying Procedure, W74-01339 7B
ZABIK, M. J. Analytical Methodology for Bioactive Com-
pounds. Photochemically Assisted Analysis of
Chlorinated Hydrocarbon Pesticides in the
Presence of Polychlorinated Biphenyls,
W74-01493 5A
ZAMOKINA, N. S.
State of Rare Earth Elements in Surface Waters (O sostoyanii redkozemel'nykh elemen-
tov v poverkhnostnykh vodakh),
W74-01395 2K
ZAWISLAK, W.
Production of Crustacean Zooplankton in Moty
Bay, Lake Jeziorak: II. Estimation of Produc- tion of the Predominating Species,
W74-01173 2H
Production of Crustacean Zooplankton in Moty
Bay, Lake Jeziorak: The method of Production
Estimation, W74-01172 2H
Zn

Assessment of Two Mesh Sizes for Interpreting Life Cycles, Standing Crop, and Percentage Composition of Stream Insects, W74-01601

ZELT, A.

ZIEBELL, C. D.
Removal of Phosphate and Secondary B.O.D.
from Tertiary treated Wastewater by Aquatic Animals.
W74-01124 5D
ZOHDY, A. A. R.
Recognition of Natural Brine by Electrical
Soundings Near the Salt Fork of the Brazos
River, Kent and Stonewall Counties, Texas,
W74-01370 2F
ZWEIDINGER, R. A.
Fluorometric Quantitation of Gallium in Biolog-
ical Materials at Nanogram Levels,
W74-01344 2K



	AVARPMINA NATIV CCCD VALININGBAR	APPON UNIV. OHIO
AASE (GEORGE) AND ASSOCIATES, INC.,	AKADEMIYA NAUK SSSR, KALININGRAD.	AKRON UNIV., OHIO.
TALLAHASSEE, FLA.	INSTITUT OKEANOLOGII.	Benthic Macroinvertebrates as Indexes of
Availability of Fresh Water in the East Central	Concentrations of Dissolved Forms of Fe, Mn,	Water Quality in Whetstone Creek, Morrow
Florida Planning Region.	and Cu in Marine Pore Waters of the Atlantic	County, Ohio (Scioto River Basin),
W74-01481 6D	Basin (Kontsentratsii rastvorennykh form Fe,	W74-01517 5B
	Mn, i Cu v morskikh, porovykh vodakh bas-	
ACADEMY OF NATURAL SCIENCES OF	seyna Atlanticheskogo okeana),	ALABAMA UNIV., BIRMINGHAM. SCHOOL
PHILADELPHIA, AVONDALE, PA. STROUD	W74-01392 2K	OF MEDICINE.
WATER RESEARCH CENTER.	W /4-01392 2K	Emission Spectrometric Determination of
Dieldrin, Effects of Chronic Sublethal Expo-	AVADEMIVA NATIV COCD I ENINCHAD	Trace Metals in Biological Tissues.
	AKADEMIYA NAUK SSSR, LENINGRAD.	W74-01546 5A
sure on Adaptation to Thermal Stress in Fresh-	FIZIKO-TEKHNICHESKII INSTITUT.	
water Fish,	Isotopic Composition of Helium in Thermal	ALASKA UNIV., COLLEGE. GEOPHYSICAL
W74-01408 5C	Springs of Iceland (Izotopnyy sostav geliya ter-	INST.
	mal'nykh istochnikov Islandii),	Seismic Evidence for Glacier Motion.
AGRICULTURAL RESEARCH COUNCIL,	W74-01396 2K	W74-01378 2C
BRIGHTON (ENGLAND). UNIT OF	***************************************	W /4-013/8
INVERTEBRATE CHEMISTRY AND	AKADEMIYA NAUK SSSR, MOSCOW.	ALASKA UNIV., COLLEGE. INST. OF MARINE
PHYSIOLOGY.	INSTITUT GEOGRAFII.	
	Problems in Hydrology of Glaciers and	SCIENCE.
The Effect of Aldrin on Water Balance in the		Pathways of Trace Elements in Arctic Lake
Freshwater Pulmonate Gastropod	Glacierized Areas (Problemy gidrologii led-	Ecosystems,
(Biomphalaria glabrata),	nikov i lednikovykh rayonev),	W74-01401 5B
W74-01525 5C	W74-01132 2C	
		Soluble Aluminum in Marine and Fresh Water
AGRICULTURAL RESEARCH SERVICE,	AKADEMIYA NAUK SSSR, MOSCOW.	by Gas-Liquid Chromatography,
BELTSVILLE, MD. AGRICULTURAL	INSTITUT GEOKHIMII I ANALITICHESKOI	W74-01446 5A
ENVIRONMENTAL QUALITY INST.	кнімп.	
	Use of Isotopic Methods to Determine Present	ALBERTA DEPT. OF LANDS AND FORESTS,
Distribution of Alkyl Arsenicals in Model	Rates of Snow Accumulation in Antarctica	EDMONTON, FISHERIES SECTION.
Ecosystem,		Assessment of Two Mesh Sizes for Interpreting
W74-01409 5C	(Ispol'zovaniye izotopnykh metodov dlya	Life Cycles, Standing Crop, and Percentage
	opredeleniya sovremennoy skorsti nakopleniya	
AGRICULTURAL RESEARCH SERVICE,	snega v Antarktide),	Composition of Stream Insects,
CHICKASHA OKLA. SOIL AND WATER	W74-01393 2C	W74-01601 2I
CONSERVATION RESEARCH DIV.		AT PRIO TIME (CURTA) PACTIT TO OP
Objective Regionalization of Peak Flow Rates,	State of Rare Earth Elements in Surface	ALEPPO UNIV. (SYRIA). FACULTY OF
	Waters (O sostoyanii redkozemel'nykh elemen-	AGRICULTURE.
W74-01174 4D	tov v poverkhnostnykh vodakh),	Autecology of Atriplex polycarpa from Califor-
	W74-01395 2K	nia,
AGRICULTURAL RESEARCH SERVICE, FORT	W 74-01393	W74-01259 2I
COLLINS, COLO.	AKADEMIYA NAUK SSSR, MOSCOW.	
Precolumn Inlet System for the Gas Chromato-		AMERICAN UNIV., BEIRUT (LEBANON).
graphic Analysis of Trace Quantities of Short-	INSTITUT VODNYKH PROBLEM.	DEPT. OF BIOLOGY.
Chain Aliphatic Amines,	Experimental Investigation of the Effect of Sal-	Sand Beach Bacteria: Enumeration and
W74-01357 5A	tating Sediments on Kinematics of Flow (Ek-	Characterization,
117701337	sperimental'noye issledovaniye vliyaniya sal'-	W74-01444 5A
AGRICULTURAL RESEARCH SERVICE,	tiruyushchikh nanosov na kinematiku potoka),	
FRESNO, CALIF. SOIL AND WATER	W74-01134 2J	AMES LAB., IOWA.
CONSERVATION RESEARCH DIV.		Lateral Diffusion Interferences in Flame
	Regional Estimate of Brackish- and Saline-	Atomic Absorption and Emission Spec-
Nitrates in Soil and Ground Water Beneath Ir-	Groundwater Yield (Regional'naya otsenka	trometry,
rigated and Fertilized Crops,	ekspluatatsionnykh resursov solonovatykh i	W74-01342 2K
W74-01245 3F	solenykh podzemnykh vod),	W 74-01342 2K
		ANIMAL AND PLANT HEALTH INSPECTION
AGRICULTURAL RESEARCH SERVICE,	W74-01137 4B	
WATKINSVILLE, GA.	Yatanatianal Salastific and Tankainal Commen	SERVICE, BELTSVILLE, MD.
Diurnal Changes in Transpiration and Daily	International Scientific and Technical Coopera-	Collaborative Study of a Colorimetric Method
	tion in the Field of Water Problems (Mezhdu-	for Determining Arsenic Residues in Red Meat
Photosynthetic Rater of Several Crop Plants,	narodnoye nauchno-tekhnicheskoye sotrud-	and Poultry,
W74-01597 2D	nichestvo v oblasti vodnykh problem),	W74-01403 5A
ACDICILI PUDAT LINER DI ACRAMICANI	W74-01138 6E	
AGRICULTURAL UNIV., WAGENINGEN		ARCH CAPE MARINE LABS., OREG.
(NETHERLANDS). LAB. OF MICROBIOLOGY.	AKADEMIYA NAUK SSSR, NOVOSIBIRSK.	Observations on the Ecology of Laminaria Sin-
Viability of Lyophilized Microorganisms after	DALNEVOSTOCHNYI GEOLOGICHESKII	clairii on Three Northern Oregon Beaches,
Storage,	INSTITUT.	W74-01423 5C
W74-01538 5C	Quaternary Shorelines of the Seas of Okhotsk	
	and Japan (Chetvertichnyye beregovyye linii	ARIZONA UNIV., TUCSON.
Investigations on the Sheathed Bacterium	Okhotskogo i Yaponskogo morey),	A Stochastic Model of Streamflow Based on
Haliscomenobacter hydrossis Gen.n., Sp.n.,		the Theory of Functions of Markov Processes,
	W74-01391 2J	W74-01123 2E
Isolated from Activated Sludge,	A ST A DEPARTMAN AND A STATE STORY	
W74-01539 5B	AKADEMIYA NAUK URSR, KIEV. INSTYTUT	Removal of Phosphate and Secondary B.O.D.
Besterialans of Astinct & States in Bart	HIDROBIOLOGII.	from Tertiary treated Wastewater by Aquatic
Bacteriology of Activated Sludge, in Particular	Role of Silt in Microcystis Aeruginosa	Animals,
the Filamentous Bacteria,	Development, (In Russian),	W74-01124 5D
W74-01540 5B	W74-01368 5C	30
		Educational Programs for Land and Water
AKADEMIYA NAUK LATVIISKOI SSR, RIGA.	AKADEMIYA NAUK URSR, KIEV. INSYTUT	Resources Development and Management,
INST. OF BIOLOGY.	BOTANIKI.	
The Effect of Substrate Humidity on the	Peat Floating in the Reservoir of the Kiev	W74-01628 6B
Supply of Macroelements to Plants, (In Latvi-	Hydroelectric Station and its Role in Water	A Mathematical Model of Primary Productivity
	Contamination, (in Russian),	and Limnological Patterns in Lake Mead,
an),		

ARIZONA UNIV., TUCSON.

A Cost-Effectiveness Study and Analysis of	AZOVE-CHERNOMORSKII	BRUSSELS UNIV. (BELGIUM).
Municipal Refuse Disposal Systems,	SELSKOKHOZYAISTVENNYI INSTITUT,	LABORATORIUM VOOR EKOLOGIE EN
W74-01631 5E	ROSTOVE-NA-DONU (USSR).	SYSTEMATIEK.
ARIZONA UNIV., TUCSON. DEPT. OF	Study of Soil Plasticity over a wide Range of Soil Moisture Contents,	Contribution to Biological and Chemical Study
AGRICULTURAL ECONOMICS.	W74-01636 2G	of the Port of Ostende, (In French), W74-01384 5B
A Linear Programming Approach to Floodplain	117-01030	W/4-01304
Land Use Planning in Urban Areas, W74-01490 3D	AZOVSKII NAUCHNO-ISSLEDOVATELSKII	BRUSSELS UNIV. (ENGLAND).
W/4-01490 3D	INSTITUT RYBNOGO KHOZYAISTVA,	PHARMACEUTICAL INST.
ARIZONA UNIV., TUCSON. DEPT. OF	ROSTOV-NA-DONU (USSR).	A Comparison of Fast Destruction Methods for
HYDROLOGY AND WATER RESOURCES.	Zoobenthos of the Azov Sea After the Control	the Determination of Trace Metals in Biological
Transient Movement of Water and Solutes in	of THE Don River, (In Russian), W74-01257 2L	Materials, W74-01317 5A
Unsaturated Soil Systems, W74-01104 2G	W/4-0125/	# /4-0131/
W/4-01104	BAYLOR COLL. OF MEDICINE, HOUSTON,	BUREAU OF ALCOHOL, TOBACCO AND
ARIZONA UNIV., TUCSON. DEPT. OF	TEX. DEPT. OF VIROLOGY AND	FIREARMS, CINCINNATI, OHIO.
WATERSHED MANAGEMENT.	EPIDEMIOLOGY.	Simple Inexpensive Freeze-Drying Procedure,
Development of a Time-Space Prediction Technique to Evaluate Snowpacks in and Ad-	Virus Concentration from Sewage,	W74-01339 7E
jacent to Forest Openings,	W74-01533 5D	BUREAU OF RECLAMATION, BOULDER
W74-01231 3B	BEAVER COLL., GLENSIDE, PA.	CITY, NEV. REGION 3.
A PARTY COLUMN TO THE PARTY OF	A Systematic Study of the Variables Involved	Geothermal Resource Investigations,
ARMY COASTAL ENGINEERING RESEARCH CENTER, WASHINGTON, D.C.	in the Reverse-Phase Thin-Layer Chromatog-	W74-01273 4E
Longshore Current Velocity: A Review of	raphy of Oxyethylated Alkyl Sulfate Surfac-	
Theory and Data,	tants,	BUREAU OF SPORT FISHERIES AND
W74-01187 2E	W74-01358 5A	WILDLIFE, STUTTGART, ARK. FISH
ARMY ENGINEER DISTRICT, MOBILE, ALA.	BEDFORD INST., DARTMOUTH (NOVA	FARMING EXPERIMENT STATION. Monitoring Channel Catfish Use of a Demand
Tallahala Creek Lake, Pascagoula River Basin.	SCOTIA).	Feeder,
Mississippi (Final Environmental Impact State-	Variation of Organochlorine Residue Levels	W74-01237 8.
ment).	with Age in Gulf of St. Lawrence Harp Seals	
W74-01610 4A	(Pagophilus Groenlandicus),	BUREAU OF SPORT FISHERIES AND
ARMY ENGINEER WATERWAYS	W74-01300 5A	WILDLIFE, WASHINGTON, D.C. OFFICE OF
EXPERIMENT STATION, VICKSBURG, MISS.	BEDFORD INST., DARTMOUTH (NOVA	ENDANGERED SPECIES.
Utilization of Remote Sensing in River Basin	SCOTIA), MARINE ECOLOGY LAB.	Greater Adaptability of Freshwater Mussels to Natural Rather Than to Artificial Displace
Studies,	Coupling Carbon Flow Through Some Pelagic	ment,
W74-01154 5A	and Benthic Communities,	W74-01235
ARMY LAND WARFARE LAB., ABERDEEN	W74-01437 5B	
PROVING GROUND, MD.		BURR-BROWN RESEARCH CORP., TUCSON,
Improved Waste Disposal Unit,	BEDFORD INST., DATRMOUTH (NOVA	ARIZ.
W74-01284 5D	SCOTIA). MARINE ECOLOGY LAB. Phytoplankton Nutrients and Flushing of Inlets	Don't Forget D/A Converter Tempco,
ATMOSPHERIC ENVIRONMENT SERVICE,	on the Coast of Nova Scotia,	W74-01507 70
TORONTO (ONTARIO).	W74-01471 5B	CALIFORNIA STATE DEPT. OF WATER
Processing and Storage of Hydrometeorological		RESOURCES, SACRAMENTO.
Data in the Atmospheric Environment Service,	BERGEN UNIV. (NORWAY). ZOOLOGICAL	Oxnard Basin Experimental Extraction-Type
W74-01290 7C	MUSEUM.	Barrier,
AUBURN UNIV., ALA. CHARLES RICHARD	Number and Size of Drifting Nymphs of	W74-01289 8E
SAUNDERS CHEMICAL LAB.	Ephemeroptera, Chironomidae, and Simulidae	CALIFORNIA STATE DEPT. OF WATER
Determination of Griseofulvin by Time-	by Day and Night in the River Stranda, Western Norway,	RESOURCES, SACREMENTO.
Resolved Phosphorimetry,	W74-01230 2I	Climatological Stations in California, 1971,
W74-01224 5A		W74-01383 70
AUBURN UNIV., ALA. DEPT. OF FISHERIES	BRNO UNIV. (CZECHOSLOVAKIA).	
AND ALLIED AQUACULTURES.	HYDROBIOLOGICKA LABORATOR.	CALIFORNIA STATE UNIV., FULLERTON.
The Chemical Oxygen Demand of Waters and	Hydrobiological Studies on the Lednicke Ryb-	DEPT. OF BIOLOGY.
Biological Materials from Ponds,	niky Ponds: Species Composition and Seasonal	The Amount of Space Available for Marine and
W74-01543 5C	Variation in the Abundance of Plankton (In Czech),	Freshwater Fishes, W74-01561 2
AUBURN UNIV., ALA. DEPT. OF	W74-01567 5C	# /4-01301 2
ZOOLOGY-ENTOMOLOGY.		CALIFORNIA STATE WATER RESOURCES
Some Influences of Aquatic Vegetation on the	BROOKE ARMY MEDICAL CENTER, FORT	CONTROL BOARD, SACRAMENTO.
Species and Number of Culicidae (Diptera) in Small Pools of Water,	SAM HOUSTON, TEX. HEALTH CARE	The Porter-Cologne Water Quality Control Act
W74-01609 2I	RESEARCH DIV.	and Related Water Code Sections (Containing
	Sensitivity of Three Selected Bacterial Species to Ozone,	the 1971 Amendments). W74-01461 50
AUBURN UNIV., ALA. WATER RESOURCES	W74-01553 5F	
RESEARCH INST.		CALIFORNIA UNIV., BERKELEY. DEPT. OF
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Textile	BROOKLYN COLL., N.Y. DEPT. OF	BOTANY.
Industry,	GEOLOGY.	The Effects of Bacteria on the Growth and
W74-01101 5G	Littoral Zone Tidal-Cycle Sedimentation,	Reproduction of Oedogonium Cardiacum,
	W74-01192 2J	W74-01422 50
AUBURN UNIV., MONTGOMERY, ALA. DEPT. OF BIOLOGY.	BROWN UNIV., PROVIDENCE, R.I. DIV. OF	CALIFORNIA UNIV., BERKELEY. DEPT. OF
Food Consumption of the Free-Living Aquatic	APPLIED MATHEMATICS.	CIVIL ENGINEERING.
Nematode Pelodera Chitwoodi,	Long Surf,	Computer Simulation of Estuarial Networks,
W74-01225 5A	W74-01203 2E	W74-01197 21

DELAWARE GEOLOGICAL SURVEY, NEWARK.

THE PROPERTY NAMED APPROPRIES	CAMPINAS UNIV. (BRAZIL). GLEB	COLORADO STATE UNIV., FORT COLLINS.
CALIFORNIA UNIV., BERKELEY.	WATAGHIN INST. OF PHYSICS.	DEPT. OF AGRICULTURAL ENGINEERING.
HYDRAULIC ENGINEERING LAB.		
Sand Movement Along Equilibrium Beaches	Novel Method of Raman Data Acquisition,	Consolidation of Irrigation Systems: Phase 1,
North of San Francisco,	W74-01330 2K	Engineering, Legal, and Sociological Con-
W74-01213 2J	CARLETON UNIV., OTTAWA (ONTARIO).	straints and/or Facilitators, W74-01367 3F
CALIFORNIA UNIV., BERKELEY. INST. OF	DEPT. OF CHEMISTRY.	W /4-0130/
	Ligand Photooxidation in Copper (II) Com-	COLORADO STATE UNIV., FORT COLLINS.
ENGINEERING RESEARCH.	plexes of Nitrilotriacetic Acid. Implications for	DEPT. OF CHEMISTRY.
Effects of Reefs and Bottom Slopes on Wind	Natural Waters.	Analytical Applications of Pulsed Voltammetric
Set-Up in Shallow Water,	W74-01400 5B	Stripping at Thin Film Mercury Electrodes,
W74-01182 2J	W/4-01400 3B	W74-01514 5A
CALIFORNIA UNIV., BERKELEY. SCHOOL OF	CASE WESTERN RESERVE UNIV.,	W 74-01314 3A
FORESTRY AND CONSERVATION.	CLEVELAND, OHIO.	COLORADO STATE UNIV., FORT COLLINS.
Persistence of Headwater Check Dams in a	Turbulent Fluid Friction of Rotating Disks,	DEPT. OF CIVIL ENGINEERING.
	W74-01640 8C	Analysis of Sediment Sorting in Alluvial Chan-
Trout Stream, W74-01566 2I	W/4-01040	nels,
W74-01566 2I	CENTER FOR DISEASE CONTROL, ATLANTA,	W74-01274 2J
CALIFORNIA UNIV., DAVIS. DEPT. OF	GA.	
BOTANY.	Practical Methods for Derivatizing and Analyz-	COLUMBIA UNIV., NEW YORK.
Desert Dogma Reexamined: Root/Shoot	ing Bacterial Metabolites with a Modified Auto-	Tidal Cycle of Changes in an Equilibrium
	matic Injector and Gas Chromatograph,	Beach, Sandy Hook, New Jersey,
Productivity and Plant Spacing, W74-01585 21	W74-01336 5A	W74-01198 2L
W 74-01363 21		
CALIFORNIA UNIV., DAVIS. DEPT. OF CIVIL	Modified Delves Cup Atomic Absorption	COMMONWEALTH SCIENTIFIC AND
ENGINEERING.	Determination of Lead in Blood,	INDUSTRIAL RESEARCH ORGANIZATION,
Characterization and Treatability of Pomace	W74-01415 5A	NORTH RYDE (AUSTRALIA).
The state of the s		Extended Tables for Kendall's Tau,
Stillage,	CENTRAL BUREAU OF STATISTICS, ACCRA	W74-01497 7C
W74-01325 5A	(GHANA).	
CALIFORNIA UNIV., DAVIS. DEPT. OF	Estimation of Domain Means Using Two-Phase	CONTINENTAL OIL CO., PONCA CITY,
ENVIRONMENTAL TOXICOLOGY.	Sampling,	OKLA. MAINTENANCE ENGINEERING DEPT.
Thermal and Base-Catalyzed Hydrolysis	W74-01498 7B	Choosing a Static Inverter System,
Products of the Systemic Fungicide, Benomyl,		W74-01547 7B
W74-01504 5B	CENTRAL ELECTRICITY GENERATING	
W /4-01304 3B	BOARD, RATCLIFFE-ON-SOAR (ENGLAND).	CORNELL UNIV., ITHACA, N.Y. DEPT. OF
CALIFORNIA UNIV., DAVIS. DEPT. OF	FRESHWATER BIOLOGY UNIT.	AGRONOMY.
WATER SCIENCE AND ENGINEERING.	Field and Experimental Studies on the Effects	2,4-dichlorophenoxyacetate metabolism by
Potential Usefulness of Antitranspirants for	of a Power Station Effluent on Tubificidae	Arthrobacter sp.: Accumulation of a Chlorobu-
•	(Oligochaeta, Annelida),	tenolide,
Solution of Some Water Supply, Plant Growth,	W74-01312 5C	W74-01550 5B
and Environmental Problems, W74-01105 3B		
W /4-01103 3B	CENTRAL NEGEV HOSPITAL, BEERSHEBA	CORNELL UNIV., ITHACA, N.Y. DEPT. OF
CALIFORNIA UNIV., LOS ANGELES. DEPT.	(ISRAEL).	ENTOMOLOGY.
OF ENGINEERING SYSTEMS.	Metabolic Effects of Drinking Brackish Water,	Ecological Impact of Pesticides,
Linear Programming and Channel Flow	W74-01632 5C	W74-01573 5C
Identification, W74-01277 8B	CENTRE NATIONAL DE LA RECHERCHE	CORNWALL RIVER AUTHORITY,
W/4-012// 8B	SCIENTIFIQUE, GRENOBLE (FRANCE).	LAUNCESTON (ENGLAND).
CALIFORNIA UNIV., LOS ANGELES. INST. OF	LABORATOIRE DE GLACIOLOGIE.	The Effect of Sand Deposition Upon the
	Flow of a Valley Glacier with a Solid Friction	Macro-Invertebrate Fauna of the River Camel,
GEOPHYSICS AND PLANETARY PHYSICS. C 18-Isoprenoid Ketone in Recent Marine Sedi-	Law,	Cornwall,
	W74-01377 2C	W74-01244 2I
ment,	CROWNON AND AREA STATE TO STAT	
W74-01301 5A	CESKOSLOVENSKA AKADEMIE VED,	The Effect of China-Clay Wastes on Stream In-
Nitrogen/Argon Ratios by Difference Thermal	TREBON. BOTANICKY USTAV.	vertebrates,
Conductivity.	Growth Rate and Development of the	W74-01527 5C
W74-01522 5A	Root/Shoot Ratio in Reedswanp Macrophytes	CORPS OF ENGINEERS, DAVIS, CALIF.
H 14-01322 3A	Grown in Winter Hydroponic Cultures,	
CALIFORNIA UNIV., LOS ANGELES. SCHOOL	W74-01346 2I	HYDROLOGIC ENGINEERING CENTER.
OF ENGINEERING AND APPLIED SCIENCE.	CHENANGO COUNTY PLANNING BOARD,	Hydrologic Engineering Methods for Water
Boundary Contractions as Controls in Two-	·	Resources Development. Volume 2. Hydrologic
Layer Flows,	NORWICH, N.Y. Relating Comprehensive Sewer and Water	Data Management,
W74-01276 8B		W74-01642 2E
VIETO 6D	Plans to the County Land Use Plan. Goals, Pol- icies and Standards.	DALHOUSIE UNIV., HALIFAX (NOVA
CALIFORNIA UNIV., RIVERSIDE.	W74-01473 5D	SCOTIA). TRACE ANALYSIS RESEARCH
Isotope Fractionation of N-15 and N-14 in	# /4-014/3 3D	CENTER.
Microbiological Nitrogen Transformations: A	CINCINNATI UNIV., OHIO. DEPT. OF	The Determination of Organo-Sulfur Com-
Theoretical Model,	CHEMISTRY.	pounds by Thin-Layer Chromatography Via a
W74-01541 5B	New Detector for Ion-Exchange Chromatog-	Ligand-Exchange Precess.
VIJ41	raphy,	W74-01439 5A
CALIFORNIA UNIV., RIVERSIDE. CITRUS	W74-01343 5A	11 -4-01435 JA
RESEARCH CENTER AND AGRICULTURAL	# /4-01343	DELAWARE GEOLOGICAL SURVEY,
EXPERIMENT STATION.	COLD REGIONS RESEARCH AND	NEWARK.
Effect of Flooding on the Twospotted Spider	ENGINEERING LAB., HANOVER, N. H.	Prediction of Well Development Possibilities in
Mite and its predators on Strawberry in	Icebergs as a Fresh-Water Source: An Ap-	Delaware by means of Calibrated Gamma-Ray
Southern California,	praisal,	Logs,
W74-01243 3F	W74-01375 2C	W74-01106 4B

DELAWARE UNIV., LEWES. COLL. OF MARINE STUDIES.

DELAWARE UNIV., LEWES. COLL. OF MARINE STUDIES. Effect of Spoil Disposal on Benthic Inver-	DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO). INLAND WATERS DIRECTORATE.	ENVIRONMENTAL PROTECTION AGENCY, ATHENS, GA. SOUTHEAST ENVIRONMENTAL RESEARCH LAB.
tebrates,	Single-Velocity Method in Measuring	Evaluation of Flame Emission Determination
W74-01420 5C	Discharge, W74-01161 2C	of Phosphorus in Water, W74-01116 5A
DELAWARE UNIV., NEWARK. COLL., OF	DEPARTMENT OF THE ENVIRONMENT.	Effects of Protozoa on the Fate of Particulate
MARINE STUDIES. Mercury in the EnvironmentA Global Review	OTTAWA (ONTARIO). WATERS BRANCH.	Carbon,
Including Recent Studies in the Delaware Bay	Short-Term Snow Melt and Ablation Derived from Heat- and Mass-Balance Measurements,	W74-01117 5C
Region, W74-01373 5B	W74-01380 2C	ENVIRONMENTAL PROTECTION AGENCY,
	DEPARTMENT OF THE ENVIRONMENT,	GULF BREEZE, FLA. GULF BREEZE LAB. Population Biomass, Number of Individuals,
DENVER REGIONAL COUNCIL OF GOVERNMENTS, COLO.	WINNIPEG (MANITOBA). FISHERIES	Average Individual Weight, and the Linear Sur-
Storm Drainage and Flood Control for	SERVICE. Unusual Occurrence of the Brook Stickleback	plus Production Model, W74-01593 2I
Metropolitan Denver. W74-01475 4A	(Culaea inconstans) in the Mackenzie River,	ENVIRONMENTAL PROTECTION AGENCY,
	Northwest Territories, W74-01589 2I	WASHINGTON, D.C. OFFICE OF WATER
DEPARTMENT OF AGRICULTURE, OTTAWA (ONTARIO). CHEMISTRY AND BIOLOGY	DEPTMENT OF THE ENVIRONMENT,	PROGRAMS. 1968 Inventory of Municipal Waste Facilities,
RESEARCH INST.	OTTAWA (ONTARIO). GLACIOLOGY DIV.	A Cooperative State Report: Region 5, Illinois,
Determination of Meleic Hydrazide Residues in	Ice Calving into the Proglacial Generator Lake,	Indiana, Michigan, Minnesota, Ohio, Wiscon-
Tobacco and Vegetables, W74-01418 5A	Baffin Island, N.W.T., Canada, W74-01376 2C	sin. W74-01282 5D
DEPARTMENT OF ENERGY, MINES AND	DETROIT UNIV., MICH.	ENVIRONMENTAL PROTECTION SERVICE,
RESOURCES, OTTAWA (ONTARIO). POLAR	Relationships of Indicator and Pathogenic Bac-	HALIFAX (NOVA SCOTIA).
CONTINENTAL SHELF PROJECT. The Mass Balance of the Sea Ice of the Arctic	teria in Stream Waters, W74-01645 5B	Supersaturation of Nitrogen in Water During Passage Through Hydroelectric Turbines at
Ocean,		Mactaquac Dam,
W74-01374 2C	DOW CHEMICAL CO., MIDLAND, MICH. ANALYTICAL LABS.	W74-01432 5C
DEPARTMENT OF THE ENVIRONMENT,	Application of Infrared Fourier Transform	ENVIRONMENTAL RESEARCH INST. OF
BURLINGTON (ONTARIO). CENTRE FOR	Spectroscopy to Analysis of Micro Samples, W74-01303 2K	MICHIGAN, ANN ARBOR. Techniques for Measuring Light Absorption
INLAND WATERS. Studies of Rapid NTA-Utilizing Bacterial Mu-	DUPETINIU DUDHAM N.C. DEBT. OF	Scattering, and Particle Concentrations in
tant,	DUKE UNIV., DURHAM, N.C. DEPT. OF ZOOLOGY; AND DUKE UNIV., BEAUFORT,	Water, W74-01283 7B
W74-01348 5B	N.C. MARINE LAB. The Circulation of Surface Waters in Raleigh	FEDERAL WATER POLLUTION CONTROL
Rapid Gas Chromatographic Method for Deter-	Bay, North Carolina,	ADMINISTRATION, ANNAPOLIS, MD.
mination of Residual Methanol in Sewage, W74-01410 5A	W74-01210 2L	CHESAPEAKE BAY-SUSQUEHANNA RIVER BASIN PROJECT.
	DUNSTAFFNAGE MARINE RESEARCH LAB.,	A Study of Tidal Dispersion in the Potomac
Mechanism of NTA Degradation By a Bacterial Mutant,	OBAN (SCOTLAND). Some Thoughts on Nutrient Limitation in Al-	River, W74-01196 5B
W74-01515 5B	gae,	
DEPARTMENT OF THE ENVIRONMENT,	W74-01428 5C	FERTILIZER CORP. OF INDIA, SINDRI. PLANNING AND DEVELOPMENT DIV.
BURLINGTON (ONTARIO). INLAND WATERS BRANCH.	EASAMS, CAMBERLEY (ENGLAND). Application of Mathematical Modelling to	The Characteristics of the Raw Waters of
Herbicide Analysis: Relationship Between	Water Quality Management,	Hasdeo River and Dhengur Nala at Korba (M. P.),
Molecular Structure and Retention Index,	W74-01486 5B	W74-01240 5A
W74-01416 5A	EAST ALABAMA REGIONAL PLANNING AND	Effect of Puddling on Physical Properties of
DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO).	DEVELOPMENT COMMISSION, ANNISTON. Sketch Development Plan, Chambers County,	Rice Soil, W74-01246 3F
Physical System Modelling as a Tool in Water	Alabama.	
Resource Planning,	W74-01485 5D	FISHERIES RESEARCH BOARD OF CANADA, NANAIMO (BRITISH COLUMBIA). PACIFIC
W74-01487 2A	EASTERN KENTUCKY UNIV., RICHMOND. DEPT. OF BIOLOGICAL SCIENCES.	OCEANOGRAPHIC GROUP.
DEPARTMENT OF THE ENVIRONMENT,	Some Observations on Bacterial Populations in	On Structure, Entrainment, and Transport in Estuarine Embayments,
OTTAWA (ONTARIO). INLAND WATERS BRANCH.	Wilgreen Lake, Madison, KY., W74-01242 5B	W74-01178 2L
A Distributed Hydrological Model Based on the		FISHERIES RESEARCH BOARD OF CANADA,
Concept of Groundwater Recharge, Transmis- sion, and Discharge,	EDINBURGH UNIV. (SCOTLAND). GRANT INST. OF GEOLOGY.	ST. JOHN'S (NEWFOUNDLAND). BIOLOGICAL STATION.
W74-01233 2F	Particulate Metals in Waters of Sorfjord West	Growth Rates of Intertidal Molluscs as Indica-
Storage and Retrieval of Groundwater Data,	Norway, W74-01528 5B	tors of Effects of Unexpected Incidents of Pol- lution,
W74-01291 7C		W74-01434 5C
Acquisition, Storage and Processing of Glacier	EDMUNDSON, KOCHENDOERFER, AND KENNEDY, PORTLAND, OREG.; AND	FISHERIES RESEARCH BOARD OF CANADA,
Inventory Data, W74-01292 7C	DANIEL, MANN, JOHNSON, AND	WINNIPEG (MANITOBA). FRESHWATER INTI.
	MENDENHALL, PORTLAND, OREG. Water Master Plan. Eugene-Springfield Ur-	Reliability of an Ammonia Probe for Elec- trometric Determination of Total Ammonia
Storage and Processing of Water Quality Data, W74-01293 7C	banizing Area. W74-01479 3D	Nitrogen in Fish Tanks, W74-01433 5A
, c	30	

FLORIDA ATLANTIC UNIV., BOCA RATON.	GARAGHTY AND MILLER, PORT	GEORGIA INST. OF TECH., ATLANTA.
REMOTE SENSING AND INTERPRETATION	WASHINGTON, N.Y.	SCHOOL OF CHEMISTRY.
LAB. Tidewater Shorelines in Broward and Palm	Regional Water Resources Studies A Spanish	Thermodynamics of Acid-Base Equilibria. II. Ionization of m- and p-Hydrox-
Beach Counties, Florida: An Analysis of	Experience, W74-01622 4B	Ionization of m- and p-Hydrox- ybenzotrifluoride and the Concept of Fluorine
Characteristics and Changes Interpreted from	W 74-01022	Double Bond-No Bond Resonance,
Color, Color Infrared and Thermal Aerial	GEOLOGICAL SURVEY.	W74-01226 2K
Imagery,	Hydrograph Simulation Models of the Hill-	
W74-01220 2L	sborough and Alafia Rivers, Florida: A Prelimi- nary Report,	GEORGIA UNIV., ATHENS. DEPT. OF GEOLOGY.
FLORIDA DEPT. OF NATURAL RESOURCES,	W74-01611 4A	Stratigraphy and Economic Geology of the
ST. PETERSBURG, MARINE RESEARCH LAB.		Coastal Plain of the Central Savannah River
Biology of the Alabama Shad in Northwest	GEOLOGICAL SURVEY DEPT.,	Area, Georgia,
Florida,	GEORGETOWN (GUYANA).	W74-01122 2J
W74-01248 2I	Erosion of Tidal Flats Near Georgetown,	GOETTINGEN UNIV. (WEST GERMANY).
FLORIDA DEPT. OF POLLUTION CONTROL.	British Guiana, W74-01216 2J	INST. OF SOIL SCIENCE AND FOOD
TALLAHASSEE.	W/4-01216	NUTRITION.
Nutrient Removal Using Lemna Minor,	GEOLOGICAL SURVEY, HARRISBURG, PA.	Desorption and Dissolution of Salts from Soils
W74-01321 5C	Near Real Time Water Resources Data for	as a Function of Soil Water Ratio,
	River Basin Management,	W74-01604 2G
FLORIDA STATE UNIV., TALLAHASSEE.	W74-01150 4A	GOSUDARSTVENNYI GIDROLOGICHESKII
DEPT. OF ECONOMICS.	GEOLOGICAL SURVEY, LAKEWOOD, COLO.	INSTITUT, LENINGRAD (USSR).
Crop Rotation Schemes for Optimal Utilization	WATER RESOURCES DIV.	Surface-Water Resources of the USSR and
of Agricultural Land, W74-01596 3F	Hydrogeologic Characteristics of the Valley-	Their Change Resulting from Human Economic
W 74-01390	Fill Aquifer in the Weldona Reach of the South	Activity (Resursy poverkhnostnykh vod SSSR i
FLORIDA STATE UNIV., TALLAHASSEE.	Platte River Valley, Colorado,	ikh izmeneniye pod vliyaniyem khozyaystven-
DEPT. OF GEOLOGY.	W74-01142 4B	noy deyatel'nosti),
The Equilibrium Beach,	CHOLOGICAL SUBSEV MENLO BARY	W74-01133 4A
W74-01195 2J	GEOLOGICAL SURVEY, MENLO PARK, CALIF.	Urbanization and Its Effects on Regimen and
FLORIDA STATE UNIV., TALLAHASSEE.	Literature on Mercury: Availability of English	Quality of Surface Waters (Urbanizatsiya i
DEPT. OF MATHEMATICS; AND FLORIDA	Translations,	yeye vliyaniye na rezhim i kachestvo poverkh-
STATE UNIV., TALLAHASSEE.	W74-01323 5A	nostnykh vod),
GEOPHYSICAL FLUID DYNAMICS INST.		W74-01139 4C
The Transverse Circulation Near a Coast,	GEOLOGICAL SURVEY, WASHINGTON, D.C.	GOSUDARSTVENNYI
W74-01206 2E	Engineering Characteristics of Overburden in	NAUCHNO-ISSLEDOVATELSKII INSTITUT
	Knox County, Tennessee,	OZERNOGO I RECHNOGO RYBNOGO
FLORIDA STATE UNIV., TALLAHASSEE.	W74-01143 7C	KHOZYAISTVA, LENINGRAD (USSR).
DEPT. OF OCEANOGRAPHY. Changes in Species Composition of	Overburden Related to Type of Bedrock and	Increase of Resistance of Carp to Dropsy by
Changes in Species Composition of Phytoplankton Due to Enrichment by N, P, and	Engineering Characteristics of the Bedrock,	Means of Breeding. II. Course of Selection and
Si of Water From a North Florida Lake,	Knox County, Tennessee,	Evaluation of the Breed Groups, (In Russian),
W74-01503 5C	W74-01144 7C	W74-01560 5C
	Categories of Relative Feasibility for Septic-	GOTEBORG UNIV. (SWEDEN). DEPT. OF
FLORIDA STATE UNIV., TALLAHASSEE.	Tank Filter Fields in Knox County, Tennessee,	ANALYTICAL CHEMISTRY.
OCEANOGRAPHIC INST. Edge Waves Over a Sloping Beach in a Rotat-	W74-01145 7C	Evaluation of the Accuracy of Gran Plots by
ing Two-Layered System,		Means of Computer Calculations. Application
W74-01218 2E	Soil Association Map of Knox County, Tennes-	to the Potentiometric Titration of the Total Al-
	see. W74-01146 7C	kalinity and Carbonate Content in Sea Water, W74-01365
FMC CORP., PRINCETON, N.J. NIAGARA	W/4-01146	W 14-01303
CHEMICAL DIV.	Ground-Water Yield Potential in Knox County,	The Potentiometric Titration of Potassium in
Ethylenethiourea Degradation,	Tennessee,	Sea Water with a Valinomycin Electrode,
W74-01340 5B	W74-01147 7C	W74-01442 5A
FOOD AND DRUG ADMINISTRATION,	Quality of Surface Waters of the United States,	GOVERNMENT INDUSTRIAL RESEARCH
WASHINGTON, D.C. DIV. OF CHEMISTRY	1968: Parts 4 and 5. St Lawrence River Basin	INST., NAGOYA (JAPAN).
AND PHYSICS.	and Hudson Bay and Upper Mississippi River	An Automated Method for the Dertemination
Criteria for Mycotoxin Standards,	Basins.	of Trace Amounts of Metal Ions by Ion-
W74-01414 5A	W74-01268 2K	Exchange Chromatography. Determination of
Infrared Studies of Chlorinated Dibenzo-p-	Areas of Possible Flooding in Knox County,	zinc (II) in Waters, W74-01438 5A
Dioxins and Structurally Related Compounds,	Tennessee,	W74-01438 5A
W74-01509 5A	W74-01269 7C	GRONINGEN RIJKSUNIVERSITEIT
		(NETHERLANDS). DEPT. OF
FORESTS COMMISSION OF VICTORIA,	Areas with Abundant Sinkholes in Knox Coun-	MICROBIOLOGY.
MELBOURNE (AUSTRALIA). Die-Back in the Mixed Hardwood Forests of	ty, Tennessee,	Rhodopseudomonas Sulfidophila, Nov. Spec.,
Eastern Victoria: A Preliminary Report,	W74-01270 7C	A New Species of the Purple Nonsulfur Bac- teria,
W74-01251 4A	A Role of Sediment Transport in Alluvial Chan-	W74-01544 5B
	nels,	
FRESHWATER BIOLOGICAL ASSOCIATION,	W74-01272 2J	GRUMMAN AEROSPACE CORP., BETHPAGE,
SHREWSBURY (ENGLAND).	Becomition of Natural Brins by District	N.Y.
Growth and Buoyancy of Microcystis aeru- ginosa Kutz. Emend. Elenkin in a Shallow	Recognition of Natural Brine by Electrical Soundings Near the Salt Fork of the Brazos	Study of Water Recovery and Solid Waste Processing for Aerospace and Domestic Appli-
Eutrophic Lake.	River, Kent and Stonewall Counties, Texas,	cations: Volume 1 - Final Report Summary,
W74-01518 5C	W74-01370 2F	W74-01280 5D

GRUMMAN AEROSPACE CORP., BETHPAGE, N.Y.

CHAME WARY ACANA MADINE LAB	IDAHO UNIV., MOSCOW. DEPT. OF	INDIAN INST. OF MANAGEMENT,
GUAM UNIV., AGANA. MARINE LAB. Algal Succession on Artificial Reefs in a	AGRICULTURAL ENGINEERING.	AHMEDABAD.
Marine Lagoon Environment in Guam,	Relationship of Pumping Lift to Economic Use	Economics of Resource Use on Sample Farms
W74-01429 5C	of Groundwater for Irrigation,	of Central Gujarat,
THE REPORT OF THE PARTY OF THE	W74-01120 4B	W74-01491 3F
GUELPH UNIV. (ONTARIO). SCHOOL OF ENGINEERING.		INSTYTUT GOSPODARKI KOMMUNALNEJ,
Data Acquisition and Storage for Research	IDAHO UNIV., MOSCOW. WATER	WARSAW (POLAND). PRACOWNIA
Watersheds,	RESOURCES RESEARCH INST.	HYDROBIOL.
W74-01295 7C	Report of Attitudes and Opinions of Recrea-	Microfauna of Activated Sludge. Part III. The
WAR AREA WARRAGES ARROOT TERMINATERS	tionists Towards Wild and Scenic Rivers: A Case Study of the St. Joe River,	Effect of Physico-Chemical Factors on the Oc-
HADASSAH MEDICAL SCHOOL, JERUSALEM	W74-01102 6B	currence of Microfauna in the Annual Cycle,
(ISRAEL). ENVIRONMENTAL HEALTH LAB. Epidemiological and Toxicological Aspects of	1171 03300	W74-01542 5C
Nitrates and Nitrites in the Environment,	ILLINOIS INST. FOR ENVIRONMENTAL	INSTYTUT ZOOTECHNIKI, OSWIECIM
W74-01386 5C	QUALITY, CHICAGO.	(POLAND). ZAKLAD DOSWIADCZALNEJ
	Pressurized Sewer Collection Systems,	ZATOR.
HARVARD UNIV., CAMBRIDGE, MASS.	W74-01286 5D	Selected Species of Algae Found in Carp Ponds
And Not a Drop to Drink: Water Resources Planning and Administration,	THE PROPERTY AND AND ACCRECATE MAIN A	of the Laskowa Complex Near Zator, W74-01607 21
W74-01465 6E	ILLINOIS UNIV., URBANA. AGRICULTURAL	W /4-0160/
	EXPERIMENT STATION. Separation and Identification of Carbofuran,	INTERSTATE SANITATION COMMISSION,
Simulating the Behavior of a Multi-Unit, Multi-	Its Metabolites, and Conjugates Found in Fish	NEW YORK.
Purpose Water-Resource System,	Exposed to Ring C-14-Labeled Carbofuran	Heavy Metals in Wastewater and Treatment
W74-01468 6A	Using ITLC Silica Gel Strips,	Plant Effluents,
HARYANA AGRICULTURAL UNIV., HISSAR	W74-01577 5A	W74-01319 5A
(INDIA). DEPT. OF AGRICULTURAL		IOWA STATE UNIV., AMES. VETERINARY
ENGINEERING.	ILLINOIS UNIV., URBANA. COLL. OF	DIAGNOSTIC LAB.
Soil Salinization Under Irrigated Cultivation,	VETERINARY MEDICINE.	Determination of Chlorinated Pesticides in
W74-01238 3F	The Determination of Thallium in Urine and	Whole Blood,
HARYANA AGRICULTURAL UNIV., HISSER	Plasma by Delves Cup Atomic Absorption,	W74-01417 5A
(INDIA). DEPT. OF SOILS.	W74-01314 5A	IOWA UNIV., IOWA CITY. STATE HYGIENIC
Effect of the Quality of Well Waters on Soils in	ILLINOIS UNIV., URBANA. DEPT. OF	LAB.
Gurgaon District,	BOTANY.	Shigella Sonnei Isolated from Well Water,
W74-01252 2G	Sensitivity of Cell Division and Cell Elongation	W74-01551 5A
HAWAII UNIV., HONOLULU.	to Low Water Potentials in Soybean	IRRIGATION RESEARCH COUNCIL,
Microdetermination of Chloro-S-Triazines in	Hypocotyls,	ISLAMABAD (PAKISTAN).
Soil by Gas-Liquid Chromatography with	W74-01249 3F	Irrigation Waters of the Indus Plains and Their
Nickel Electron Capture or Electrolytic Con-	HILINOICHNIN TIBBANA DEBE OF CIVIL	Salt Load,
ductivity Detection,	ILLINOIS UNIV., URBANA. DEPT. OF CIVIL	W74-01639 3C
W74-01304 5A	ENGINEERING. Hydrodynamic Modeling of Two-Dimensional	JAPAN ATOMIC ENERGY RESEARCH INST.,
HAWAII UNIV., HONOLULU. DEPT. OF	Watershed Flow,	TOKAL
BOTANY.	W74-01278 2A	Extraction-Photometric Determination of
New Records of Sargassum Hawaiiensis Doty		Uranium (IV) with Chlorophosphonazo-III,
and Newhouse (Sargassaceae, Phaeophyta), a	Chlorinated Hydrocarbon Insecticides in Sedi-	W74-01364 5A
Deep Water Species,	ments of Southern Lake Michigan,	JAPAN ATOMIC ENERGY RESEARCH INST.,
W74-01349 2I	W74-01397 5B	TOKYO.
HERKENHOFF (GORDON) AND ASSOCIATES,	ILLINOIS UNIV., URBANA. DEPT. OF	On the Small-Scale Horizontal Diffusion Near
ALBUQUERQUE, N. MEX.	GEOLOGY.	the Coast,
Engineer's Report for South Valley Water	On the Optimal Operation of Groundwater	W74-01186 5B
System. W74-01382 6B	Basins: A Calculus of Variations Approach,	JOHNS HOPKINS UNIV., BALTIMORE, MD.
# /4*U1302 6B	W74-01489 4B	DEPT. OF MECHANICS AND MATERIALS
HEROIT-WATT UNIV., (SOCTLAND). DEPT.	IMPERIAL COLL OF COMPAGE AND	SCIENCE.
OF BREWING AND BIOLOGICAL SCIENCES.	IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). DEPT.	Beach Equilibrium and Second-Order Wave
Computer Identification of Yeasts of the Genus	OF CHEMISTRY.	Theory,
Saccharomyces, W74-01646 5A	Investigation of Spectral Overlap of the Neon	W74-01201 2E
11 /- 11040 3A	359.352-nm and Chromium 359.349-nm Spectral	JYVASKYLA UNIV. (FINLAND). DEPT. OF
HOFFMANN-LA ROCHE, INC., NUTLEY, N.J.	Lines in Atomic Absorption and Atomic	BIOLOGY.
ANIMAL HEALTH RESEARCH.	Fluorescence Spectrometry of Chromium,	The Bottom Macrofauna of the Oligotrophic
Small-Volume Solid-Electrode Flow-Through	W74-01337 2K	Lake Konnevesi, Finland,
Electrochemical Cells. Preliminary Evaluation Using Pulse Polarographic Techniques.	IMPERIAL COLL OF SCIENCE AND	W74-01287 , 5C
W74-01445 7B	IMPERIAL COLL. OF SCIENCE AND	KANSAS AGRICULTURAL EXPERIMENT
	TECHNOLOGY, LONDON (ENGLAND). DEPT. OF CIVIL ENGINEERING.	STATION, MANHATTAN.
HONG KONG UNIV. DEPT. OF MECHANICAL	Cohesionless, Fine Graded, Flaked Sediment	EVAPOTRANSPIRATION LAB.
ENGINEERING.	Transport by Water,	Stomatal-Diffusion Resistance and Water
Flow Visualization in Free Shear Layers, W74-01271 8B	W74-01125 2J	Potential of Soybean and Sorghum Leaves, W74-01605 3F
	WINTEN COUNCIL OR : COLOUR DIVINI	
HYDRAULICS RESEARCH STATION,	INDIAN COUNCIL OF AGRICULTURAL	KANSAS UNIV., LAWRENCE. DIV. OF
WALLINGFORD (ENGLAND). Sediment Transport: New Approach and Anal-	RESEARCH, NEW DELHI. Effect of Moisture Stress on Soybean (Glycine	BIOLOGICAL SCIENCES.
ysis,	max (L.) Merr.),	Population Dynamics of Pond Zooplankton, I. Diaptomus pallidus Herrick,
W74-01279 2J	W74-01599 3F	W74-01502 5C

MASSACHUSETTS UNIV., AMHERST. DEPT. OF FORESTRY AND

KANSAS UNIV., LAWRENCE. SCHOOL OF BUSINESS.	LEEDS UNIV. (ENGLAND), DEPT. OF MECHANICAL ENGINEERING.	MACQUARIE UNIV., NORTH RYDE (AUSTRALIA). SCHOOL OF EARTH
Simulation of Water Recreation Users' Deci-	The Influence of Topography and Pressure	SCIENCES.
sions, W74-01464 6D	Gradients on Shoaling in a Tidal Estuary, W74-01204 2L	Leaf Temperatures, Diffusion Resistances, and Transpiration,
W/4-04404		W74-01254 2D
KASHMIR UNIV., SRINAGAR (INDIA). DEPT.	LEEDS UNIV. (ENGLAND). WELLCOME	
OF ZOOLOGY.	MARINE LAB.	MAINE DEPT. OF INLAND FISHERIES AND
A First Record of Red-Water Phenomenon in	Growth Rates of Sediment-Living Marine	GAME, BANGOR.
Kashmir, India, W74-01564 5C	Protozoan as a Toxicity Indicator for Heavy	Further Studies of Fish Predation on Salmon
W74-01564 5C	Metals, W74-01529 5A	Stocked in Maine Lakes,
KEMPAS DEVON ESTATE, MALACCA	W/4-01329 3A	W74-01603 2H
(MALAYSIA).	LEHIGH UNIV., BETHLEHEM, PA. MARINE	MANITOBA UNIV., WINNIPEG. DEPT. OF
A Chemical Survey of the Malacca River,	SCIENCE CENTER.	ZOOLOGY.
W74-01600 2K	Sedimentation in a Meandering Estuary,	Distribution and Morphological Variation of
KIEL UNIV. (WEST GERMANY). INSTITUT	W74-01177 2L	Lampsilis radiata (Pelecypoda, Unionidae) in
FUER MEERESKUNDE.	LEXINGTON AND FAYETTE COUNTY	Some Central Canadian Lakes: A Multivariate
Investigations on the Influence of Tides on	PLANNING COMMISSION, LEXINGTON, KY.	Statistical Approach,
Salinity, Content of Suspended Matter, Sedi-	A Growing Community: 1973 Update, (Lexing-	W74-01608 2H
mentation and Bacteria Counts in the Elbe	ton, Kentucky).	MARINE BIOLOGICAL STATION, PORT ERIN,
Estuary, (Untersuchungen Uber Die Einwir-	W74-01484 5D	ISLE OF MAN (ENGLAND).
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gehalt, Sedimentation Und Bakteriengehalt in	LIVERPOOL OBSERVATORY AND TIDAL	static Pressure and Light During Larval
Der unterelbe),	INST., BIRKENHEAD (ENGLAND).	Development of the Lobster Homarus Gam-
W74-01175 2L	The Generation of Longshore Currents on a	marus,
KILBOM ENGINEERING LTD., TORONTO	Plane Beach, W74-01208 2L	W74-01436 5C
(ONTARIO).	W 74-01206 ZL	MADVI AND UNIV COLLECT BADY DEST
Report on Laurel Creek Channel Improve-	LOUISIANA STATE UNIV., BATON ROUGE.	MARYLAND UNIV., COLLEGE PARK. DEPT. OF CHEMISTRY.
ments, Waterloo and Bridgeport, Ontario.	Nitrate Reduction in Soils: Effect of Soil	Biochemistry of Estuarine Ecosystem with
W74-01482 4A	Moisture Tension,	Emphasis on Heavy Metals and Shellfish,
	W74-01583 2G	W74-01108 5C
KINNERAT LIMNOLOGY LAB., TIBERIAS	Thermal Stratification in Industrial Canals	
(ISRAEL). Modifications in Filtration Methods for the	Thermal Stratification in Industrial Canals, W74-01594 2E	MARYLAND UNIV., COLLEGE PARK. DEPT.
Measurement of Inorganic C-14 Uptake by	W/4-01394 2E	OF MICROBIOLOGY.
Photosynthesizing Algae,	LOUISIANA STATE UNIV., BATON ROUGE.	Biodegradation of Phenylmercuric Acetate by
W74-01425 5A	COASTAL STUDIES INST.	Mercury-Resistant Bacteria,
	Beach Cusps,	W74-01555 5B
KINNERET LIMNOLOGY LAB., TIBERIAS	W74-01180 2J	MASSACHUSETTS INST. OF TECH.,
(ISRAEL).	South American Marine Energy,	CAMBRIDGE.
Metalimnic Layer in Lake Kinneret, Israel, W74-01598 5C	W74-01181 8A	Holbrook Cove Survey A 1972 Student
W 74-01396 3C	W/4-01101	Summer Ocean Engineering Laboratory
KOLLSMAN INSTRUMENT CORP., SYOSSET,	LOUISIANA STATE UNIV., BATON ROUGE.	Research Project.
N.Y.	DEPT. OF CHEMISTRY.	W74-01131 5B
A Resonant Capsule Pressure Transducer For	The Determination of Cadmium by Atomic Ab-	Ocean Utilization and Coastal Zone Develop-
Data Buoys,	sorption in Air, Water, Sea Water and Urine	ment.
W74-01160 7B	with a R.F. Carbon Bed Atomizer, W74-01441 5A	W74-01281 2L
KYOTO UNIV., OTSU (JAPAN). OTSU	W/4-01441 JA	
HYDROBIOLOGICAL STATION.	LOUISIANA STATE UNIV., NEW ORLEANS.	Longshore Current Generation by Obliquely In-
Some Sources of Error in the 14C Method for	DEPT. OF BIOLOGICAL SCIENCES.	cident Internal Waves,
Estimating Primary Productivity and Their	Electrophoretic and Immunological Analyses of	W74-01650 2E
Relationship to Light Intensity During Incuba-	Seven Chlorosarcinacean Algae,	MASSACHUSETTS INST. OF TECH.,
tion,	W74-01426 5A	CAMBRIDGE, DEPT. OF MATHEMATICS.
W74-01217 2H	LOUISIANA STATE UNIV., NEW ORLEANS.	A Note on Edge Waves in a Stratified Fluid,
LABORATORY FOR RESEARCH FIS. DIS., NIR	DEPT. OF CHEMISTRY.	W74-01194 2E
DAVID (ISRAEL).	The Determination of Lead and Nickel by	
Fisheries and Fish Culture in Israel in 1971,	Atomic-Absorption Spectrometry with a	MASSACHUSETTS UNIV., AMHERST. DEPT.
W74-01570 6B	Flameless Wire Loop Atomizer,	OF AGRICULTURAL AND FOOD
TAMONT POURDEN CROI OCICAL	W74-01363 5A	ECONOMICS. Valuation of Visual-Cultural Benefits from
LAMONT-DOHERTY GEOLOGICAL OBSERVATORY, PALISADES, N.Y.	Glass-Metal Composite Electrodes,	Freshwater Wetlands in Massachusetts,
Experiments and Hydrographic Surveys Off	W74-01512 2K	W74-01643 6B
Sandy Hook, New Jersey (1963),	W/7-01312	
W74-01199 2L	LUND UNIV. (SWEDEN). LIMNOLOGICAL	MASSACHUSETTS UNIV., AMHERST. DEPT.
The state of the s	INST.	OF CHEMISTRY.
LAVAL UNIV., QUEBEC.	Swedish Lake Restoration Program Gets	Atomic Absorption Method for Determining
The Planktonic Association (Cladocera and	Results,	Micromolar Quantities of Aliphatic Secondary
Copepoda) of a Dimictic Lake of the Lau-	W74-01262 5G	Amines, W74-01492 5A
rentides Park, Quebec, (In French), W74-01558 2H	LYON UNIV. (FRANCE). UNITE	H /4-01474 3A
11.7-01336 Zh	D'ENSEIGNEMENT ET DE RECHERCHE	MASSACHUSETTS UNIV., AMHERST. DEPT.
LBC AND W ASSOCIATES, COLUMBIA, S.C.	SCIENCES PHARM.	OF FORESTRY AND WILDLIFE
Functional Water and Sewerage Plan and Pro-	A Diseased Trout: Microbiological Study of Its	MANAGEMENT.
gram.	Principal Organs and Its Environment,	A Reliable and Inexpensive Soil Frost Gage,
W74-01469 5D	W74-01267 5C	W74-01574 2G

MASSACHUSETTS UNIV., AMHERST. WATER RESOURCES RESEARCH

MASSACHUSETTS UNIV., AMHERST. WATER RESOURCES RESEARCH CENTER. Graduate Courses Related to Water Resources.	MICHIGAN STATE UNIV., EAST LANSING. PESTICIDE RESEARCH CENTER. Analytical Methodology for Bioactive Com-	vorennymi veshchestvami mezhdu donnymi ot- lozheniyami i vodoy razlichnykh vodoyemov), W74-01389 2J
W74-01119 9A Mathematical Modeling of Nutrient - Trans-	pounds. Photochemically Assisted Analysis of Chlorinated Hydrocarbon Pesticides in the	MOSCOW STATE UNIV. (USSR). DEPT. OF ICHTHYOLOGY.
port,	Presence of Polychlorinated Biphenyls, W74-01493 5A	Oxbow Cut-Off Bog Lake Zooplankton of the
W74-01121 5B	MIDDLESEX HOSPITAL MEDICAL SCHOOL,	Kolyma Basin (In Russian), W74-01265 2H
MASSACHUSETTS UNIV., GLOUCESTER. MARINE STATION.	LONDON (ENGLAND). The Sensitivity of Suppressed and Unsup-	MOSCOW STATE UNIV. (USSR).
Sublittoral Benthic Marine Algae of Southern Cape Cod and Adjacent Islands: Pseu-	pressed Lon Strains of Escherichia coli to	PROBLEMNAYA LABORATORIYA
dolithoderma Paradoxum Sp. Nov. (Ralf-	Chemical Agents with Induce Filamentation, W74-01524 5C	KOMPLEKSNOGO KARTOGRAFIROVANIYA I ATLASOV.
siaceae, Ectocarpales), W74-01350 5A	MINISTRY OF AGRICULTURE AND	Geophysical Measurements of the Thickness of the Malyy Azau Glacier (Geofizicheskiye
MASSEY UNIV., PALMERSTON NORTH (NEW	FISHERIES, WELLINGTON (NEW ZEALAND).	opredeleniya moshchnosti lednika Malyy
ZEALAND). DEPT. OF CHEMISTRY AND	FISHERIES RESEARCH DIV. Effects of Paraquat on Invertebrates in a Can-	Azau), W74-01390 2C
BIOCHEMISTRY. Natural Dispersion of Mercury from Puhipuhi,	tebury Stream, New Zealand, W74-01298 5C	MOSKOVSKAYA
Northland, New Zealand, W74-01307 5B	MINNESOTA UNIV., ST. PAUL. DEPT. OF	SELSKOKHOZYAISTVENNAYA AKADEMIYA
	ENTOMOLOGY, FISHERIES AND WILDLIFE.	(USSR). The Action of Mineral Fertilization on Pasture
MASSEY UNIV., PALMERSTON NORTH (NEW ZEALAND). DEPT. OF MICROBIOLOGY AND GENETICS.	Swimming Endurance and Resistance to Copper and Malathion of Bluegills Treated by Long-Term Exposure to Sublethal Levels of	Herbage, Irrigated with Sewage, (In Russian), W74-01559 5D
Protozoa from Blue Lake, Raoul Island, W74-01310 5C	Hydrogen Sulfide,	MOSKOVSKII GEOLOGORAZVEDOCHNYI
	W74-01579 5C	INSTITUT (USSR). Isotopic Composition of Oxygen and Hydrogen
MCGILL UNIV., MONTREAL (QUEBEC). DEPT. OF BIOCHEMISTRY.	MISSOURI UNIV., COLUMBIA. The Importance of Chelating Agents in Natural	in Sulfide Waters of the Sochi-Adler Artesian
A Procedure for the Estimation of Microgram Quantities of Triton X-100,	Waters and Wastewaters, W74-01326 5B	Basin (Izotopnyy sostav kisloroda i vodorada sul'fidnykh vod Sochi-Adlerskogo artezian-
W74-01360 5A		skogo basseyna),
MCMASTER UNIV., HAMILTON (ONTARIO).	MISSOURI UNIV., COLUMBIA. DEPT. OF AGRICULTURAL CHEMISTRY.	W74-01394 2K
CENTER FOR APPLIED RESEARCH AND ENGINEERING DESIGN.	Critical Study of the APCD-MIBK Extraction System for Atomic Absorption.	MOSKOVSKII GOSUDARSTVENNYI MEDITSINSKII INSTITUT (I).
Planned Data Storage Methods for the Interna-	W74-01329 5A	Comparative Evaluation of the Efficacy of
tional Field Year for the Great Lakes, W74-01296 7C	MISSOURI UNIV., COLUMBIA. DEPT. OF	Ozonization and Other Means of Treating Water Containinated With Oil Products (In
MEDICAL COLL. OF OHIO, TOLEDO. DEPT.	CHEMISTRY. Copper Micronutrient Requirement for Algae,	Russian),
OF MICROBIOLOGY.	W74-01398 5C	
An Improved Method of Cell Enumeration for Filamentous Algae and Bacteria,	MONSANTO CO., ST. LOUIS, MO.	MOSKOVSKII GOSUDARSTVENNYI MEDITSINSKII INSTITUT (I) (USSR).
W74-01421 5A	Biodegradation of O-Benzyl-P-Chlorophenol, W74-01552 5B	Barrier Role of Water Works Installations in Respect to Chemical Contaminations Classified
METROPOLITAN DENVER SEWAGE DISPOSAL DISTRICT NO. 1, COMMERCE	MONTANA STATE UNIV., BOZEMAN. DEPT.	According to Organoleptic Properties of
CITY, COLO.	OF BOTANY AND MICROBIOLOGY.	Hazards, (In Russian), W74-01584 5D
A Modified Filtration Method for the Analysis of Wastewater Suspended Solids,	Survival of Coliform Bacteria in Natural Waters: Field and Laboratory Studies with	NAIROBI UNIV. (KENYA).
W74-01318 5A	Membrane-Filter Chambers, W74-01250 5B	Pankhurst Tubes Modified to Indicate
MIAMI UNIV., CORAL GABLES, FLA.		Anaerobiosis, W74-01545 5A
Chemical Relationships Between Surface Water and the Ground in South Florida,	MONTANA STATE UNIV., BOZEMAN. DEPT. OF EARTH SCIENCES.	NARINO UNIV., PASTO (COLOMBIA).
W74-01153 2K	Comparison of the Snow Resistograph with the Ram Penetrometer,	FACULTAD DE CIENCIAS AGRICULTURAS.
MIAMI UNIV., OXFORD, OHIO. DEPT. OF GEOLOGY.	W74-01381 2C	Physical Properties of Some Volcanic-Ash Derived Soils of the Highlands of Pasto.
Sr-87/Sr-86 Ratios and Total Strontium Con-	MOSCOW STATE UNIV. (USSR). CHAIR OF	Narino, Colombia, (In Spanish),
centrations in Surface Waters of the Scioto River Drainage Basin, Ohio,	GEMORPHOLOGY. A Method of Forecasting the Building of a	W74-01228 2G
W74-01516 5B	River Bar (Metod prognoza pereformirovaniy rechnogo bara),	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, BAY SAINT LOUIS, MISS.
MICHIGAN STATE UNIV., EAST LANSING. DEPT. OF PHYSIOLOGY.	W74-01388 2J	EARTH RESOURCES LAB. Land Use and Mapping,
Uptake of Methyl Mercuric Chloride and Mer-	MOSCOW STATE UNIV. (USSR). CHAIR OF	W74-01165 4A
curic Chloride by Trout: A Study of Uptake Pathways into the Whole Animal and Uptake	HYDROLOGY. Prospects for the Use and Conservation of	NATIONAL AERONAUTICS AND SPACE
by Erythrocytes in Vitro,	Water Resources in the USSR (Perspektivy	ADMINISTRATION, GREENBELT, MD. GODDARD SPACE FLIGHT CENTER.
W74-01412 5C	ispol'zovaniya i okhrany vodnykh resursov SSSR),	Mineral Resources, Geological Structure and
MICHIGAN STATE UNIV., EAST LANSING. INST. OF WATER RESEARCH.	W74-01387 6B	Landform Surveys, W74-01166 70
Stream Community Response to Nutrient En- richment.	A Study of the Exchange of Dissolved Solids Between Bottom Sediments and Water of Dif-	
W74-01499 5C	ferent Water Bodies (Izucheniye obmena rast-	Environment Surveys, W74-01167 5A

NICOLAS COPERNICUS UNIV. OF TORUN, ILAWA (POLAND). DEPT.

Water Resources,	NATIONAL OCEANIC AND ATMOSPHERIC	NEW BRUNSWICK UNIV., FREDERICTON.
W74-01168 7C	ADMINISTRATION, CORAL GABLES, FLA. EXPERIMENTAL METEOROLOGY LAB.	DEPT. OF CIVIL ENGINEERING. Computer Utilization of Hydrological Data for
Marine Resources and Ocean Surveys,	Comparison of Gage and Radar Methods of	North Nashwaaksis Representative Basin,
W74-01169 7B	Convective Precipitation Measurement, W74-01149 2B	W74-01294 7C
Interpretation Techniques Development,		NEW HAMPSHIRE UNIV., DURHAM. DEPT.
W74-01170 7B	NATIONAL OCEANIC AND ATMOSPHERIC	OF BOTANY.
	ADMINISTRATION, MIAMI, FLA. ATLANTIC	Probable Causes for the 1972 Red Tide in the
NATIONAL AERONAUTICS AND SPACE	OCEANOGRAPHIC AND METEOROLOGICAL LABS.	Cape Ann Region of the Gulf of Maine, W74-01435 5C
ADMINISTRATION, HOUSTON, TEX. LYNDON B. JOHNSON SPACE CENTER.	Estuarine Circulation Induced by Diffusion,	***************************************
Agriculture, Forestry, Range Resources,	W74-01222 2L	NEW MEXICO INST. OF MINING AND
W74-01164 3F		TECHNOLOGY, SOCORRO. DEPT. OF
	NATIONAL OCEANIC AND ATMOSPHERIC	GROUND-WATER HYDROLOGY. Numerical Solution of Multiphase Well Flow,
NATIONAL AERONAUTICS AND SPACE	ADMINISTRATION, ROCKVILLE, MD. International Field Year for the Great Lakes.	W74-01275 8B
ADMINISTRATION, LANGLEY STATION, VA.	W74-01162 2H	W 74 012 13
LANGLEY RESEARCH CENTER. Using Computers to Analyze Continuous Data,	W/4-01102	NEW MEXICO STATE UNIV., UNIVERSITY
W74-01520 7C	NATIONAL SCIENCE FOUNDATION,	PARK. DEPT. OF AGRICULTURE
77-01320	WASHINGTON, D.C. OFFICE OF POLAR	ENGINEERING. Brush Eradicating, Basin Pitting, and Seeding
NATIONAL AERONAUTICS AND SPACE	PROGRAMS. The Soviet Darms ProgramTwenty Years of	Machine for Arid to Semiarid Rangeland,
ADMINISTRATION, WALLOPS ISLAND, VA.	Development, Deployment, and Data,	W74-01637 4A
WALLOPS STATION.	W74-01157 7C	
Multidisciplinary/Regional Resource Surveys,		NEW MEXICO UNIV., ALBUQUERQUE. DEPT.
W74-01171 7B	NATURAL AND HISTORIC RESOURCE	OF BIOLOGY. Hydrologic Nutrient Cycle Interactions in
NATIONAL CANCER INST., BETHESDA, MD.	ASSOCIATES, PHILADELPHIA, PA.	Undisturbed and Manipulated Ecosystems
DIV. OF CANCER CAUSE AND PREVENTION.	Inventory and Evaluation of Information on Delaware Bay, Volume 2.	(Watersheds),
N-Nitrosation by Nitrite Ion in Neutral and	W74-01369 6E	W74-01110 4C
Basic Medium,		NEW SOUTH WALES DEPT. OF
W74-01328 5B	NATURE CONSERVANCY, ABERYSTWYTH	AGRICULTURE, RYDALMERE (AUSTRALIA).
NATIONAL ENGINEERING SCIENCE CO	(WALES). Factors Affecting the Distribution of Some	BIOLOGICAL AND CHEMICAL RESEARCH
PASADENA, CALIF.	Phryganeaeid (Trichoptera) in Malham Tarn,	INST.
Note on the Equations of Long Waves Over an	Yorkshire,	Prevention of Selenium Interference with Mea-
Uneven Bottom,	W74-01586 2I	surement of Phosphate as its Molybdenum (V-
W74-01189 2E	NAMES BOOKERA BULANTE COMOOF	VI) Complex, W74-01345 SA
NATIONAL INST. FOR PHYSICAL PLANNING	NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.	11.7 013.73
AND CONSTRUCTION RESEARCH, DUBLIN	Wave-Induced Water Particle Motion Measure-	NEW YORK STATE DEPT. OF HEALTH,
(IRELAND).	ments,	ALBANY. DIV. OF LAB., AND RESEARCH.
An Automatic Separator for the Removal of	W74-01285 2E	Fluorometric Determination of Selenium in Water with 2,3-Diaminonaphthalene,
Aquatic Insects from Detritus,	NAVAL BECEARCH LAB WACHINGTON	W74-01399 5A
W74-01624 7B	NAVAL RESEARCH LAB., WASHINGTON, D.C. ELECTROCHEMISTRY BRANCH.	
NATIONAL INST. OF DENTAL RESEARCH,	Automated Rapid Scan Instrument for Spec-	NEW YORK UNIV., N.Y. DEPT. OF
BETHESDA, MD.	troelectrochemistry in the Visible Region,	CHEMISTRY. Quantitative Analysis of Aqueous
Effect of Partial Defluoridation of a Water	W74-01331 2K	Nitrite/Nitrate Solutions by Infrared Internal
Supply on Dental Fluorosis: Final Results in	NAVAL UNDERSEA CENTER, SAN DIEGO,	Reflectance Spectrometry,
Bartlett, Texas, After 17 Years,	CALIF.	W74-01402 2K
W74-01578 5F	Simultaneous Determination of Manganese,	NEW ZEALAND OCEANOGRAPHIC INST.,
NATIONAL INSTITUTES OF HEALTH,	Copper, Arsenic, Cadmium, Antimony and	WELLINGTON, DEPT. OF SCIENTIFIC AND
BETHESDA, MD. CLINICAL PATHOLOGY	Mercury in Glacial Ice by Radioactivation,	INDUSTRIAL RESEARCH.
DEPT.	W74-01361 5A	Revision of Family and Some Generic Defini-
Computer Identification of Bacteria on the	NAVY HYDROGRAPHIC OFFICE,	tions in the Phaennidae and Scolecithricidae
Basis of Their Antibiotic Susceptibility Pat-	WASHINGTON, D.C. OCEANOGRAPHIC	(Copepoda: Calanoida), W74-01308 5A
terns, W74-01443 5A	ANALYSIS DIV.	W 14-01300
	Harbor Analog System, Part I - Waves, W74-01200 2L	NEWCASTLE-UPON-TYPE UNIV. (ENGLAND).
NATIONAL MARINE FISHERIES SERVICE,	W /4-01200 2L	DEPT. OF ZOOLOGY.
BEAUFORT, N.C. ATLANTIC ESTUARINE	NEUCHATEL UNIV. (SWITZERLAND).	An Oxygen Electrode Microrespirometer, W74-01419 5A
FISHERIES CENTER. Relation Between Total Body Weight and Con-	CENTRAHYDROGEOLOGIE.	
centrations of Manganese, Iron, Copper, Zinc,	Prediction of the Variation in the Chemistry of	NICOLAS COPERNICUS UNIV. OF TORUN,
and Mercury in White Muscle of Bluefish (Po-	a Lake Resulting from an Increase in Soluble	ILAWA (POLAND). DEPT. OF
matomus saltatrix) and A Bathyl-Dimersal Fish	Deposits: Application: The Sodium in Lake Neuchatel,	HYDROBIOLOGY. Production of Crustacean Zooplankton in Moty
Antimora Rostrata,	W74-01562 2H	Bay, Lake Jeziorak: The method of Production
W74-01413 5B		Estimation,

NEUCHATEL UNIV. (SWITZERLAND).

Study of the Speed of Water Circulation in a

Water-Bearing Limestone Deposit by Tracing Tests (La Serriere River Basin/NE), W74-01563 2F

CENTRE DE HYDROGEOLOGIE.

NATIONAL MARINE FISHERIES SERVICE,

GALVESTON, TEX. BIOLOGICAL LAB.
Some Effects of Filtration on the Determina-

tion of Nutrients in Fresh and Salt Water, W74-01521

7B

2H

W74-01172

W74-01173

Production of Crustacean Zooplankton in Moty

Bay, Lake Jeziorak: II. Estimation of Produc-

tion of the Predominating Species,

NORTH CAROLINA STATE UNIV., RALEIGH.		
NORTH CAROLINA STATE UNIV., RALEIGH.	NORWEGIAN INST. OF URBAN AND	OREGON STATE UNIV., CORVALLIS. DEPT.
Wastewater Characterization of Sweet Potato	REGIONAL RESEARCH, OSLO.	OF FISHERIES AND WILDLIFE. Metabolism and Biliary Excretion of Sul-
Processing, W74-01324 5A	A Hybrid Model for Irrigation Planning Using Chance Constrained Programming and Hydrologic Simulation,	fobromophthalein by Rainbow Trout (Salmo Gairdneri),
NORTH CAROLINA STATE UNIV., RALEIGH.	W74-01488 4B	W74-01411 5C
DEPT. OF BIOLOGICAL AND	NORWEGIAN WATER RESOURCES AND	OREGON STATE UNIV., CORVALLIS. DEPT.
AGRICULTURAL ENGINEERING.	ELECTRICITY BOARD, OSLO.	OF OCEANOGRAPHY.
Agricultural Water Demand in North Carolina:	A Deterministic Parametric Water-Balance	Spectral Absorption of Solar Radiation in Al-
Phases I and II, W74-01112 6D	Model,	pine Snowfields,
W/4-01112	W74-01126 2A	W74-01626 2C
NORTH CAROLINA STATE UNIV., RALEIGH.	NOTTINGHAM UNIV. (ENGLAND). DEPT. OF	OREGON UNIV., EUGENE. DEPT. OF
DEPT. OF GEOSCIENCES.	PHARMACY.	BIOLOGY.
Precipitation Variability Over North Carolina,	Degradative Versatility of Corynebacterium	Thermophilic Ostracod: Aquatic Metazoan with the Highest Known Temperature Tolerance,
W74-01111 2B	pseudodiphtheriticum NCIB 10803 which uses	W74-01327 50
NORTH CAROLINA UNIV., CHAPEL HILL.	Amides as Carbon Source, W74-01536 5B	
Simulation Models for Water-Resource	1174-01330	OSLO UNIV. (NORWAY). DEPT. OF LIMNOLOGY.
Systems: Their Utility in Measuring Physical	NOVOCHERKASSKII	'Trapped Sea-Water' in Rorholtfjorden,
and Economic Effects of Weather Forecasting	INZHENERNO-MELIORATIVNYI INSTITUT	W74-01263 2K
and Weather Modification: Summary Report,	(USSR). Effect of an Increased Water Rate in Liquid	OVEODD SEWACE WORKS (ENCLAND)
W74-01463 3B	Dressing on Sugar Beet Yield, (In Russian),	OXFORD SEWAGE WORKS (ENGLAND). Automatic Samplers for Sewage and Effluents,
The Role of Universities in Water Resources	W74-01211 3F	W74-01306 5A
Education: The Social Sciences,		
W74-01467 6B	OAK RIDGE ASSOCIATED UNIVERSITIES, INC., TENN. SPECIAL TRAINING DIV.	PAEDOGOGISCHE HOCHSCHULE, LOERRACH (WEST GERMANY).
	Distribution Studies of Radium and Other	Profile of the Vegetation of the Elburs Moun
NORTH CAROLINA UNIV., CHAPEL HILL.	Metallic Elements Between Thenoyl-	tain Range (Northern Iran), (In German),
CENTER FOR URBAN AND REGIONAL	trifluoroacetone in Methyl Isobutyl Ketone and	W74-01385
STUDIES. Promoting Environmental Quality Through	Aqueous Solutions,	PANAMETRICS, INC., WALTHAM, MASS.
Urban Planning and Controls,	W74-01494 5A	Ultrasonic Thermometry,
W74-01470 5D	OAK RIDGE NATIONAL LAB., TENN.	W74-01501 7E
	The Interstate Water Pollution CompactPaper	PARMA UNIV. (ITALY). ISTITUTO DI
NORTH CAROLINA UNIV., CHAPEL HILL.	Tiger or Effective Regulatory Device,	ZOOLOGIA E ANATOMIA COMPARATA.
SCHOOL OF PUBLIC HEALTH. Chemical Constants of Metal Complexes from	W74-01450 5G	Notes on the Dynamics of the Reproductive
a Complexometric Titration Followed with	OFFICE DE LA RECHERCHE SCIENTIFIQUE	Activity of Arctodiaptomus Bacillifer in High
Anodic Stripping Voltammetry,	ET TECHNIQUE OUTRE-MER, PARIS	Altitude Alpine Lakes, W74-01209 2F
W74-01332 5A	(FRANCE).	W /4-01209
	Hydrological Information for the Planning of	PENNSYLVANIA STATE UNIV., UNIVERSITY
Acridine Orange-Epifluorescence Technique	Water Resources in Developing Countries (L- 'Information Hydrologique Pour La Planifica-	PARK. DEPT. OF BIOLOGY. Element Constitution of Selected Aquation
for Counting Bacteria in Natural Waters, W74-01534 5A	tion des Resources Hydrauliques Dans Les	Vascular Plants from Pennsylvania: Submersed
***************************************	Pays en Voie de Developpement),	and Floating Leaved Species and Rooted Emer
NORTH CAROLINA UNIV., CHAPEL HILL.	W74-01623 7C	gent Species,
WILLIAM R. KENAN, JR. LAB. OF	OFFICE OF THE CHIEF OF ENGINEERS	W74-01526 5A
CHEMISTRY. Anion Responses and Potential Functions for	(ARMY), WASHINGTON, D.C. CIVIL WORKS	POLISH ACADEMY OF SCIENCES, KRAKOW.
Neutral Carrier Membrane Electrodes,	PLANNING DIV.	INSTYTUT BOTANIKI.
W74-01334 2K	River Basin Planning in the United States,	Diatoms of the Upper Course of the Stream
	W74-01472 6B	Sanka (Cracow-Czestochowa Upland), (In Polish),
NORTHERN FOREST RESEARCH CENTER,	OHIO AGRICULTURAL RESEARCH AND	W74-01258 2
EDMONTON (ALBERTA).	DEVELOPMENT CENTER, WOOSTER. LAB.	
Soil Aeration Response to Draining Intensity in	OF ENVIRONMENTAL STUDIES.	POLISH ACADEMY OF SCIENCES, KRAKOW. ZAKLAD BIOLOGII WOD.
Basin Peat, W74-01255 2G	The Relationship Between Maple Canker In-	Occurrence and Cumulation of Microcom
W/4-01233	cidence and Precipitation, W74-01602 21	ponents in Bottom Sediments of Dam Reser
NORTHERN ILLINOIS UNIV., DEKALB. DEPT.		voirs of Southern Poland,
OF CHEMISTRY.	OHIO STATE UNIV., COLUMBUS. DEPT. OF	W74-01565 5E
Solvent Extraction of Metal 1,10-	CHEMISTRY. Indirect Coulometric Titration of Biological	PURDUE UNIV., LAFAYETTE, IND.
Phenanthroline Complexes and Concentration	Electron Transport Components,	AGRICULTURAL EXPERIMENT STATION.
of Trace Amounts of Metal Ions Prior to Spec-	W74-01338 2K	Effect of Portland Cement on Soil Aggregation
trophotometric or Flame Photometric Deter- mination,		and Hydraulic Properties, W74-01576 20
W74-01354 5A	OKLAHOMA STATE UNIV., STILLWATER.	
	DEPT. OF CIVIL ENGINEERING. Sensitivity of Groundwater flow Models to	QUEENSLAND UNIV., BRISBANE
Double Pulse Coulostatics,	Vertical Variability of Aquifer Constants,	(AUSTRALIA). DEPT. OF BOTANY. Water Use by Perennial Evergreen Plant Com
W74-01511 2K	W74-01151 4B	munities in Australia and Papua New Guinea,
NORTHWESTERN UNIV., EVANSTON, ILL.	OREGON STATE UNIV., CORVALLIS, DEPT.	W74-01634 2I
DEPT. OF CIVIL ENGINEERING.	OF BOTANY.	QUEENSLAND UNIV., BRISBANE
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W74-01107 5D	W74-01430 5B	W74-01253
08.10		
OR-10		

5B

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River Estuaries, W74-01205 2L	Substantiation of the Maximum Permissible	Soil and Water Conservation on Arable Lands,
W /4-01203	Concentration of ANP-2 Compound in Water	W74-01633 3F
RESEARCH TRIANGLE INST., DURHAM, N.C.	Bodies, (In Russian),	***************************************
Fluorometric Quantitation of Gallium in Biolog-	W74-01581 5G	SOMERSET RARITAN VALLEY SEWERAGE,
ical Materials at Nanogram Levels, W74-01344 2K	SANTA CLARA, UNIV., CALIF.	SOMERVILLE, N.J.
W74-01344 2K	Early Thoughts on Prosecuting Polluters,	Improved Distillation Method for Volatile
RESOURCES FOR THE FUTURE, INC.,	W74-01613 5G	Acids Analysis,
WASHINGTON, D.C.		W74-01322 5A
Impact of Irrigation Investments on Regional	SASKATCHEWAN DEPT. OF NATURAL	COURT DAVOTA COORDS ATIVE PICHERY
and Urban Development,	RESOURCES SASKATOON. FISHERIES	SOUTH DAKOTA COOPERATIVE FISHERY
W74-01625 6B	WILDLIFE BRANCH.	UNIT, BROOKINGS.
REYNOLDS, SMITH AND HILLS,	Limnology and Fishery Biology of Black Lake,	Nutrient Sources and Transport in the Upper
JACKSONVILLE, FLA.	Northern Saskatchewan, W74-01234 2H	and Central Regions of the Big Sioux River,
Utility Provisions Analysis for East Central	W/4-01234 2H	W74-01115 5B
Florida.	SAURASHTRA UNIV., RAJKOT, (INDIA).	SOUTH DAKOTA SCHOOL OF MINES AND
W74-01480 6D	DEPT. OF BIOSCIENCES.	TECHNOLOGY, RAPID CITY. DEPT. OF
ROANOKE COLL., SALEM, VA. DEPT. OF	Physiological Ecology of Gelidiella Acerosa	* a
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Fishes of Mason Creek, an Upper Roanoke		
River Drainage Tributary, Virginia,	SCRIPPS INSTITUTION OF OCEANOGRAPHY,	Sandstones from Pumping and Static Level
W74-01592 2I	LA JOLLA, CALIF.	Data in Selected Areas of Western South Dakota.
BOLLE BOYCE LTD. DEBRY (ENGLAND)	The Equations of Continuity for Seawater and	W74-01113 2F
ROLLS-ROYCE LTD., DERBY (ENGLAND). ADVANCED RESEARCH GROUP.	River Water in Estuaries, W74-01207 2L	W/401115
The Breaking of Waves on a Sloping Beach,	W/4-0120/	Determination of the Total Storage Capacity of
W74-01176 2E	Littoral Processes and the Development of	the Cretaceous Sandstone Aquifers in South
	Shorelines,	Dakota,
ROTHAMSTED EXPERIMENTAL STATION,	W74-01212 2J	W74-01114 2F
HARPENDEN (ENGLAND).		
Effects of Shading and of Seasonal Differences	Concentrations of Plutonium, Cobalt, and	SOUTH DAKOTA STATE UNIV., BROOKINGS.
in Weathering on the Growth, Sugar Content and Sugar Yield of Sugar Beet Crops,	Silver Radionuclides in Selected Pacific	DEPT. OF BIOCHEMISTRY.
W74-01229 3F	Seaweeds, W74-01297	Simplified Spectrophotometric Analysis of
	W /4-0129/	Plants for Selenium,
ROYAL UNIV. OF MALTA, VALLETTA. DEPT.	SERVICOS HIDRAULICOS, LOURENCO	W74-01406 2K
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The Carbohydrate and Water Balance of Beans	Water Resources Planning Mozambique (La	SOUTHAMPTON UNIV. (ENGLAND). DEPT. OF
(Vicia faba) Attacked by Broomrape (Orobanche crenata),	Planification Des Resources en Eau au	OCEANOGRAPHY.
W74-01575 3F	Mozamique),	Concentrations of Some Trace Metals in
W/4-013/3	W74-01629 6B	Pelagic Organisms and of Mercury in Northeast
RUTGERS - THE STATE UNIV., NEW	CERON HALL HARD COURT OR ANCE N.I.	Atlantic Ocean Water, W74-01523 5C
BRUNSWICK, N.J. DEPT. OF BIOCHEMISTRY	SETON HALL UNIV., SOUTH ORANGE, N.J. DEPT. OF CHEMISTRY.	W 74-01323
AND MICROBIOLOGY.	Gas-Solid Chromatography on Macroreticular	SOUTHEASTERN WISCONSIN REGIONAL
Inhibition by Fatty Acids of the Biodegradation	Cation Exchange Resins.	PLANNING COMMISSION, WAUKESHA.
of Petroleum, W74-01537 5B	W74-01495 5A	Floodland and Shoreland Development Guide.
W /4-0133/		W74-01483 4A
RUTGERS - THE STATE UNIV., NEW	SKIDAWAY INST. OF OCEANOGRAPHY,	
BRUNSWICK, N.J. WATER RESOURCES	SAVANNAH, GA.	SOUTHWESTERN ILLINOIS METROPOLITAN
RESEARCH INST.	Observations of Net Shoreline Positions and	AREA PLANNING COMMISSION,
Mobile Oxygen Dispersion Craft,	Approximations of Barrier Island Sediment	COLLINSVILLE.
W74-01232 5G	Budgets, W74-01372 2L	Comprehensive Water and Sewer Plan, Ran-
SAINT LOUIS, UNIV., MO. DEPT. OF	W/4-013/2	dolph County, Illinois.
BIOLOGY.	SKIDMORE COLL., SARATOGA SPRINGS, N.	W74-01474 5D
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tain Brush Zone, Utah,	Seasonal Variation of Chemical Parameters in	STANFORD UNIV., CALIF. DEPT. OF CIVIL
W74-01588 2I	Alaskan Tundra Lakes,	ENGINEERING.
Carbon Dioxide Exchange by Several Stream-	W74-01347 5B	Observations and Experiments on Solitary
Side and Scrub Oak Community Species of Red	CLOVENOVE NA BORNE SALVENOVA	Wave Deformation,
Butte Canyon, Utah,	SLOVENSKE NARODNE MUZEUM,	W74-01215 8B
W74-01590 2I	BRATISLAVA (CZECHOSLOVAKIA).	STANLEY CONSULTANTS, INC., MUSCATINE,
SAN DIEGO COUNTY WATER AUTHORITY	Phytoplankton of the Czechoslovak Sector of the Danube and of the Estuaries of the Prin-	IOWA. DEPT. OF ENGINEERING.
SAN DIEGO COUNTY WATER AUTHORITY, CALIF.	cipal Tributaries on Czechoslovak Territory,	Stability and Reach Length in Water Surface
Tri-Agencies Pipeline: Engineering Report.	(In Czect.),	Profile Determination,
W74-01477 8A	W74-01371 2I	W74-01152 2F

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Atomizer for the Routine Determination of	Parahaemolyticus of Oysters (Crassostrea Vir-	the Juneau Icefield, South-Eastern Alaska.
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W74-01316 5A	Bay,	W74-01379 2C
STATE UNIV. COLL., GENESEO, N.Y. DEPT.	W74-01548 5C	UNITED AIRCRAFT RESEARCH LAB., EAST
OF BIOLOGY.	TEXAS TECH UNIV., LUBBOCK.	HARTFORD, CONN.
Salinity Adaptation by Dunaliella Tertiolecta. I.	Underground Storage of Texas Playa Lake	Vortex Concept for Separating Oil from Water,
Increases in Carbonic Anhydrase Activity and	Waters by Injection Into the Ogallala Forma-	W74-01148 5G
Evidence for a Light-Dependent Na (Plus)/H	tion Under Moderate Pump Pressure, W74-01627 4B	UNITED STATES LAKE SURVEY, DETROIT,
(Plus) Exchange, W74-01427 5C		MICH.
	TEXAS TECH UNIV., LUBBOCK. DEPT. OF	Shifting Offshore Bars and Harbor Shoaling,
STATE UNIV. OF NEW YORK, BUFFALO.	RANGE AND WILDLIFE MANAGEMENT. Effects of Leaf-Footed Bugs on Mesquite	W74-01191 2J
DEPT. OF CHEMISTRY. Ion Selective Sensors,	Reproduction,	Currents at Toledo Harbor,
W74-01506 5A	W74-01638 4A	W74-01214 2H
	TOWAS TOSH HARV THEBOSE WATER	UNIVERSITY COLL, OF SOUTH WALES AND
Ion-Electrode Based Automatic Glucose Analy-	TEXAS TECH UNIV., LUBBOCK. WATER RESOURCES CENTER.	MONMOUTHSHIRE, CARDIFF, DEPT. OF
sis System,	Recreational Reuse of Municipal Wastewater,	MICROBIOLOGY.
W74-01513 5A	W74-01103 5D	The Role of Micro-Organisms in Waste Tip-
SWEDISH METEOROLOGICAL AND		Lagoon Systems Purifying Coke-Oven Ef-
HYDROLOGICAL INST., STOCKHOLM.	TEXAS UNIV., AUSTIN. DEPT. OF	fluents, W74-01647 5D
Development of A Conceptual Deterministic	MICROBIOLOGY. Studies on Methanol-Oxidizing Bacteria. I.	W 74-01047 3D
Rainfall-Runoff Model,	Isolation and Growth Studies,	UNIVERSITY COLL. OF SOUTH WALES AND
W74-01128 2A	W74-01535 5C	MONMOUTHSHIRE, CARDIFF. DEPT. OF
TECHNICAL UNIV. OF DENMARK,	TEXAS UNIV., AUSTIN. DIV. OF NATURAL	ZOOLOGY. The Structure of an Acid Moorland Pond Com-
COPENHAGEN. INST. OF HYDRODYNAMICS	RESOURCES AND THE ENVIRONMENT.	munity,
AND HYDRAULIC ENGINEERING.	The Management of Bay and Estuarine	W74-01508 5C
Numerical Simulation of the Rainfall-Runoff Process on a Daily Basis,	Systems in the Texas Coastal Zone, Phase II.	
W74-01127 2A	W74-01620 5G	UNIVERSITY OF THE SOUTH PACIFIC, SUVA
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Reservoir Mechanism in an Aquifer of Arbitra-	BIOLOGICAL SCIENCES.	Sedimentary Sulphur Cycle,
ry Boundary Shape, W74-01129 2F	Germination Responses of a Texas Population	W74-01239 5B
W74-01129 2F	of Ocotillo (Fouquieria splendens Engelm.) To	UNIVERSITY OF THE WITWATERSRAND,
TENNESSEE GAME AND FISH COMMISSION,	Constant Temperature, Water Stress, pH and	JOHANNESBURG (SOUTH AFRICA). DEPT. OF
NASHVILLE.	Salinity, W74-01591 2I	BOTANY.
Freshwater Mussel Ecology, Kentucky Lake,		The Ecology of the Diatoms of the Klip River,
Tennessee, May 1, 1969-June 15, 1972, W74-01641 5C	TOKYO UNIV. (JAPAN). OCEAN RESEARCH	Southern Transvaal, W74-01313 5C
	INST. Experimental Study of Wave Reflection by a	W /4-01313
TENNESSEE UNIV., KNOXVILLE. DEPT. OF	Sloping Beach,	UNVERSITY OF THE WITWATERSRAND,
MICROBIOLOGY. Litmus Milk Reaction as a Distinguishing Fea-	W74-01223 2E	JOHANNESBURG (SOUTH AFRICA).
ture Between Streptococcus Faecalis of Human	Silies Cal Madium for Enumeration of Potrals	A Waterborne Actinomycete Resembling
and Non-Human Origins,	Silica Gel Medium for Enumeration of Petrole- umlytic Microorganisms in the Marine Environ-	Strains Causing Mycetoma, W74-01256 5B
W74-01549 5A	ment,	
TENNESSEE VALLEY AUTHORITY,	W74-01532 5A	UPPSALA UNIV. (SWEDEN). DEPT. OF
CHATTANOGA. DIV. OF ENVIRONMENTAL	TOKYO UNIV. OF FISHERIES (JAPAN).	ANALYTICAL CHEMISTRY. Ion Pair Partition Chromatography of Organic
PLANNING.	Distribution of (C-14) PCBs in Carp,	Ammonium Compounds,
Comparison of Gelman and Millipore Mem-	W74-01530 SC	W74-01496 5A
brane Filters for Enumerating Fecal Coliform	TOPONTO UNITE ONTE DECEMBER OF CHILIF	TIRREAT A VINITU (CHUPRON) THOR OF
Bacteria, W74-01554 5A	TORONTO UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.	UPPSALA UNIV. (SWEDEN). INST. OF ZOOLOGY.
717 01337	Fate of Lignin in Kraft Effluent Treatment,	Bottom Fauna as an Indicator of Water Quality
TENNESSEE VALLEY AUTHORITY, MUSCLE	W74-01320 5B	in Sweden's Large Lakes (Lakes Malaren, Vat-
SHOALS, ALA. DIV. OF CHEMICAL DEVELOPMENT.	TREAT DATE BETTER DODOLOU (ONTARIO)	tern and Vanern),
Separation of Polyphosphates by Paper Chro-	TRENT UNIV., PETERBOROUGH (ONTARIO). DEPT. OF CHEMISTRY.	W74-01531 5B
matography with a New Solvent,	Semiintegral Electroanalysis: Shapes of	VIRGINIA COMMONWEALTH UNIV.,
W74-01366 5A	Neopolarograms,	RICHMOND. DEPT. OF BIOLOGY.
TEXAS A AND M UNIV., COLLEGE STATION.	W74-01333 5A	Evaluation of the Response of Dugesia Tigrina
DEPT. OF AGRICULTURAL ANALYTICAL	TUFTS UNIV., MEDFORD, MASS. DEPT. OF	to Aflatoxin B1, W74-01404 5C
SERVICES.	GEOLOGY.	
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Chlorpyriphos in Dursban Insecticide Formula-	Comparison of the Normal and the	GLOUCESTER POINT. Sediment Transport in a Coastal Plain Estuary.
tions, W74-01405 5A	Catastrophic, W74-01193 2L	W74-01185 2L
JA.		

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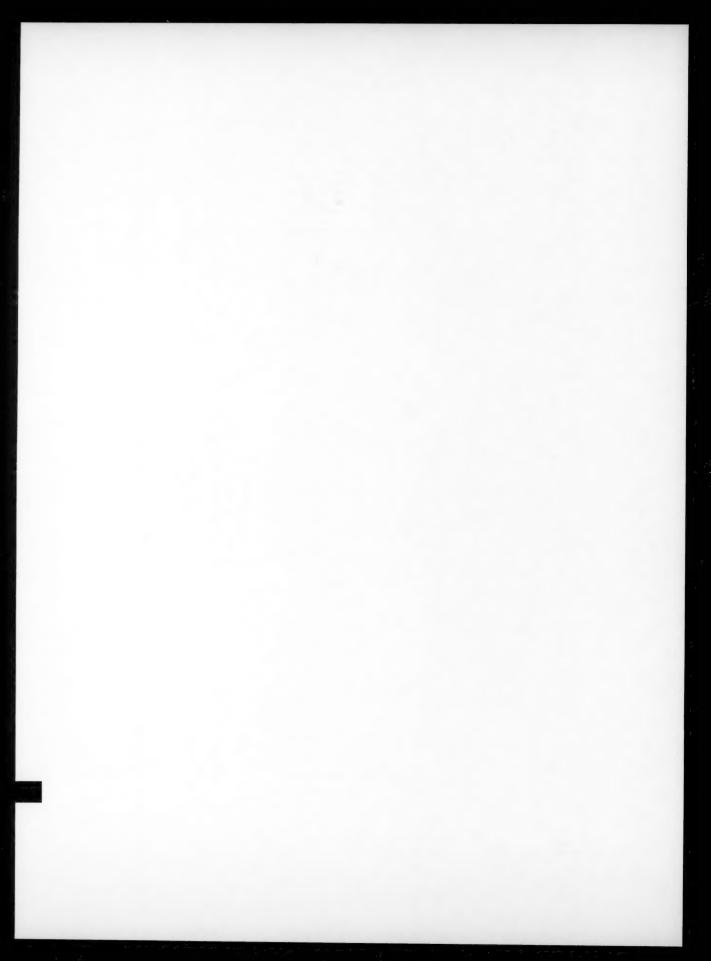
VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF BIOLOGY. Two New Chytrids from the Appalachian	WASHINGTON UNIV., ST. LOUIS, MO. BIOMEDICAL COMPUTER LAB. Versatile Computer Generated Variable Ac-	WISCONSIN UNIV., MILWAUKEE. COLL. OF APPLIED SCIENCE AND ENGINEERING. Drawdown at Time-Dependent Flowrate,
Highlands, W74-01305 5A	celerating Voltage Circuit for Magnetically Scanned Mass Spectrometers. Use for Assays	W74-01155 2F
	in the Picogram Range and for Assays of Stable	WOODS HOLE OCEANOGRAPHIC
VIRGINIA POLYTECHNIC INST. AND STATE UNIV, BLACKSBURG. DEPT. OF SOCIOLOGY.	Isotope Tracers, W74-01335 2K	INSTITUTION, MASS. Kinetics of Silicon-Limited Growth in the Marine Diatom Thalassiosira pseudonana Hasle
Concept-Scale Interaction with the Semantic	WATERLOO LUTHERAN UNIV (ONTARIO)	and Heimdal (Equals Cyclotella Nana Hustedt),
Differential Technique, W74-01644 6B	WATERLOO LUTHERAN UNIV. (ONTARIO). Temperature Selection by Juvenile and Adult Yellow Perch (Perca Flavescens) Acclimated to	W74-01431 5C
VIRGINIA UNIV., CHARLOTTESVILLE.	24 C,	WRIGHT STATE UNIV., DAYTON, OHIO. DEPT. OF BIOLOGICAL SCIENCES.
Beach Changes on the Outer Banks of North	W74-01353 5A	The Distribution, Composition and Biomass of
Carolina,		the Crustacean Zooplankton Population in
W74-01179 2E	WATERLOO UNIV. (ONTARIO).	Western Lake Superior,
VSESOYUZNYI	Emergence, Reproduction, and Growth of Setipalpian Plecoptera in Southern Ontario,	W74-01109 5C
NAUCHNO-ISSLEDOVATELSKII INSTITUT	W74-01359 5A	WUERZBURGH UNIV. (WEST GERMANY).
MASLICHNYKH I EFIROMASLICHNYKH	***************************************	BORANISCHES INSTITUT II.
KULTUR, KRASNODAR (USSR).	WATERLOO UNIV., (ONTARIO). DEPT. OF	A New Type of Climatized Gas Exchange
Water Regime of Sunflower Under Different	BIOLOGY.	Chamber for Net Photosynthesis and Trans-
Conditions of Phosphorus Nutrition, (In Rus-	Diatom Flora of the Grand River, Ontario,	piration Measurements in the Field, W74-01568 2I
sian), W74-01227 3F	Canada, W74-01311 5A	W 74-01368 21
W /4-0122/	W74-01311 5A	WYZSZA SZKOLA ROLNICZA,
VYSOKA SKOLA ZEMEDELSKA, BRNO	WEST PAKISTAN AGRICULTURAL UNIV.,	OLSZTYN-KORTOWA (POLAND). INSTYTUT
(CZECHOSLOVAKIA). FAKULTA LESNICKA.	LYALLPUR. DEPT. OF AGRONOMY.	HYDROBIOLOGII OCHRANY WODNEGO.
Protective Function of the Forest in Areas of	Water Requirements of Wheat and Cotton on a	Investigations on the Changes in the Content of Heavy Metals in Lake Waters of the Masurian
Waterwork Reservoirs, (In Czech),	High Water Table Soil Under Arid Conditions,	Lake District,
W74-01582 4A	W74-01595 3F	W74-01221 5B
WAIKATO UNIV., HAMILTON (NEW	WEST VIRGINIA UNIV., MORGANTOWN.	
ZEALAND). SCHOOL OF SCIENCE.	DEPT. OF CIVIL ENGINEERING.	WYZSZA SZKOLA ROLNICZA, SZCZECIN (POLAND), KATEDRA BOTANIKI.
A New Species of Boeckella (Copepoda: Cala-	Evaluation of the Bio-Disc Treatment Process	Batrachospermum Vagum Ag. in the Szczecin
noida) from Northland, New Zealand,	for Summer Camp Application,	Pomerania, A Locality New to Poland, (In
W74-01309 5A	W74-01118 5D	Polish),
WASHINGTON UNIV., SEATTLE.	WESTERN AUSTRALIA UNIV., NEDLANDS.	W74-01219 2H
Arctic Data Buoys and Aidjex,	INST. OF AGRICULTURE.	YORK UNIV., DOWNSVIEW (ONTARIO).
W74-01156 7B	Determination of Low Concentrations of	DEPT. OF BIOLOGY.
	Cobalt in Plant Material by Atomic Absorption	Loss of Photosynthetic Activity in Two Blue-
Barometric Pressure Measurements from	Spectrophotometry,	Green Algae as a Result of Osmotic Stress,
Buoys During AIDJEX 1972, W74-01159 7B	W74-01356 2K	W74-01302 5B
W /4-01139 /B	WESTERN AUSTRALIAN INST. OF TECH.,	ZEGREB UNIV. (YUGOSLOVIA). FACULTY OF
WASHINGTON UNIV., SEATTLE. APPLIED	PERTH. DEPT. OF MEDICAL TECHNOLOGY.	AGRICULTURE.
PHYSICS LAB.	Microbial Culture Media Preparation,	The Influence of Some Climatic Factors on the
The Arctic Data Buoy, A System for Environ-	W74-01505 5A	Productivity of Red Clover Seed, (In Serbo-
mental Monitoring in the Arctic,	WESTFIELD COLL., LONDON (ENGLAND).	Croatian), W74-01556 3F
W74-01158 7B	DEPT OF ZOOLOGY.	
WASHINGTON UNIV., SEATTLE. DEPT. OF	Distribution Patterns and Population Dyanmics	
BOTANY.	of the Micro-Arthropods of a Desert Soil in	
The Vegetation of Findley Lake Basin,	Southern California,	
W74-01587 5C	W74-01635 2I	
WASHINGTON UNIV., SEATTLE. DEPT. OF	WILLIAMS COLL., WILLIAMSTOWN, MASS.	
CIVIL ENGINEERING.	Coastal Processes and Beach Dynamics at	
The Relations of Periphytic and Planktonic	Sheboygan, Wisconsin, July, 1972,	
Algal Growth in an Estuary to Hydrographic	W74-01130 2H	
Factors,	A Profile of the Four Moment Measures Per-	
W74-01571 5C	pendicular to a Shore Line, South Haven,	
WASHINGTON UNIV., SEATTLE. DEPT. OF	Michigan,	
OCEANOGRAPHY.	W74-01184 2H	
The Union of the Columbia River and the	WIGGONOW WANT MARKON BUT OF	
Pacific Ocean General Features,	WISCONSIN UNIV., MADISON. DEPT. OF	
W74-01183 2L.	BACTERIOLOGY. Algal Excretion of C-14-Labeled Compounds	
Tidal Period Oscillations of an Isohaline Sur-	and Microbial Interactions in Cyanidium cal-	
face Off the Mouth of the Columbia River,	darium Mats,	
W74-01188 2L	W74-01510 5C	

WISCONSIN UNIV., MADISON. WATER

5**B**

Effects of Friction and Surface Tide Angle of Incidence on the Coastal Generation of Internal Tides,
W74-01190

WISCONSIN UNIV., MADISON. WACHEMISTRY PROGRAM.
Leaves as Source of Phosphorus,
W74-01407



ACCESSION NUMBER INDEX

W74-01101	5G	W74-01179	2E	W74-01257	2L	W74-01335	2K
W74-01102	6B	W74-01180	2.1	W74-01258	21	W74-01336	5A
W74-01103	5D	W74-01181	8A	W74-01259	21	W74-01337	2K
W74-01104	2G	W74-01182	2J	W74-01260	5B	W74-01338	2K
W74-01105	3B	W74-01183	2L	W74-01261	21	W74-01339	7B
W74-01106	4B	W74-01184	2H	W74-01262	5G	W74-01340	5B
W74-01107	5D	W74-01185	2L	W74-01263	2K	W74-01341	2H
W74-01108	5C	W74-01186	5B	W74-01264	21	W74-01342	2K
W74-01109	5C	W74-01187	2E	W74-01265	2H	W74-01343	5A
W74-01110	4C	W74-01188	2L	W74-01266	2J	W74-01344	2K
W74-01111	2B	W74-01189	2E	W74-01267	5C	W74-01345	5A
W74-01112	6D	W74-01190	2E	W74-01268	2K	W74-01346	21
W74-01113	2F	W74-01191	23	W74-01269	7C	W74-01347	5B
W74-01114	2F	W74-01192	2J	W74-01270	7C	W74-01348	5B
W74-01115	5B	W74-01193	2L.	W74-01271	8B	W74-01349	21
W74-01116	5A	W74-01194	2E	W74-01272	2J	W74-01350	5A
W74-01117	5C	W74-01195	2.5	W74-01273	4B	W74-01351	2H
W74-01118	5D	W74-01196	5B	W74-01274	2J	W74-01352	5B
W74-01119	9A	W74-01197	2L	W74-01275	8B	W74-01353	5A
W74-01120	4B	W74-01198	2L	W74-01276	8B	W74-01354	5A
W74-01121	5B	W74-01199	2L	W74-01277	8B	W74-01355	5A
W74-01122	2J						
		W74-01200	2L	W74-01278	2A	W74-01356	2K
W74-01123	2E	W74-01201	2E	W74-01279	2J	W74-01357	5A
W74-01124	5D	W74-01202	3F	W74-01280	5D	W74-01358	5A
W74-01125	2J	W74-01203	2E	W74-01281	2L	W74-01359	5A
W74-01126	2A	W74-01204	2L	W74-01282	5D	W74-01360	5A
W74-01127	2A	W74-01205	2L	W74-01283	7B	W74-01361	5A
W74-01128	2A	W74-01206	2E	W74-01284	5D	W74-01362	21
W74-01129	2F	W74-01207	2L	W74-01285	2E	W74-01363	5A
W74-01130	2H	W74-01208	2L	W74-01286	5D	W74-01364	5A
W74-01131	5B	W74-01209	2H	W74-01287	5C	W74-01365	2K
W74-01132	2C	W74-01210	2L.	W74-01288	2K	W74-01366	5A
W74-01133	4A	W74-01211	3F	W74-01289	8B	W74-01367	3F
W74-01134	2J	W74-01212	2J	W74-01290	7C	W74-01368	5C
W74-01135	3E	W74-01213	23	W74-01291	7C	W74-01369	6E
W74-01136	4B	W74-01214	2H	W74-01292	7C	W74-01370	2F
W74-01137	4B	W74-01215	8B	W74-01293	7C	W74-01371	21
W74-01138	6E	W74-01216	2J	W74-01294	7C	W74-01372	2L
W74-01139	4C	W74-01217	2H	W74-01295	7C .	W74-01373	5B
W74-01140	2E	W74-01218	2E	W74-01296	7C	W74-01374	2C
W74-01141	2F	W74-01219	2H	W74-01297		W74-01375	2C

W74-01142	4B	W74-01220	2L	W74-01298	5C	W74-01376	2C
W74-01143	7C	W74-01221	5B	W74-01299	21	W74-01377	2C
W74-01144	7C	W74-01222	2L	W74-01300	5A	W74-01378	2C
W74-01145	7C	W74-01223	2E	W74-01301	5A	W74-01379	2C
W74-01146	7C	W74-01224	5A	W74-01302	5B	W74-01380	2C
W74-01147	7C	W74-01225	5A	W74-01303	2K	W74-01381	2C
W74-01148	5G	W74-01226	2K	W74-01304	5A	W74-01382	6B
	2B						
W74-01149		W74-01227	3F	W74-01305	5A	W74-01383	7C
W74-01150	4A	W74-01228	2G	W74-01306	5A	W74-01384	5 B
W74-01151	4B	W74-01229	3F	W74-01307	5B	W74-01385	21
W74-01152	2E	W74-01230	21	W74-01308	5A	W74-01386	5C
W74-01153	2K	W74-01231	3B	W74-01309	5A	W74-01387	6B
W74-01154	5A	W74-01232	5G	W74-01310	5C	W74-01388	2Ј
W74-01155	2F	W74-01233	2F	W74-01311	5A	W74-01389	2J
W74-01156	7B	W74-01234	2H	W74-01312	5C	W74-01390	2C
W74-01157	7C	W74-01235	8I	W74-01313	5C	W74-01390	23
W74-01158	7B	W74-01236	5F	W74-01314	5A	W74-01392	2K
W74-01159	7B	W74-01237	81	W74-01315	5A	W74-01393	2C
W74-01160	7B	W74-01238	3F	W74-01316	5A	W74-01394	2K
W74-01161	2C	W74-01239	5B	W74-01317	5A	W74-01395	2K
W74-01162	2H	W74-01240		W74-01318		W74-01396	2K
W74-01163	7C	W74-01241	3F	W74-01319		W74-01397	
W74-01164	3F	W74-01242	5B	W74-01320	5B	W74-01398	5C
W74-01164 W74-01165		W74-01242	3F		5C		5A
	4A 2C			W74-01321		W74-01399	
W74-01166	7C	W74-01244	21	W74-01322	5A	W74-01400	5B
W74-01167	5A	W74-01245	3F	W74-01323	5A	W74-01401	5B
W74-01168	7C	W74-01246	3F	W74-01324	5A	W74-01402	2K
W74-01169	7B	W74-01247	7B	W74-01325	5A	W74-01403	5A
W74-01170	7B	W74-01248	21	W74-01326	5B	W74-01404	5C
W74-01171	7B	W74-01249	3F	W74-01327	5C	W74-01405	5A
W74-01172	2H	W74-01250	5B	W74-01328	5B	W74-01406	2K
W74-01172		W74-01251					
	2H		4A	W74-01329	5A	W74-01407	
W74-01174	4D	W74-01252	2G	W74-01330	2K	W74-01408	5C
W74-01175	2L	W74-01253	5B	W74-01331	2K	W74-01409	5C
W74-01176	2E	W74-01254	2D	W74-01332	5A	W74-01410	5A
W74-01177	2L	W74-01255	2G	W74-01333	5A	W74-01411	5C
W74-01178	2L	W74-01256	5B	W74-01334	2K	W74-01412	5C

W74-01413

W74-01413	5B	W74-01492	5A
W74-01414	5A	W74-01493	5A
W74-01415	5A	W74-01494	5A 5A
W74-01416 W74-01417	SA SA	W74-01495 W74-01496	5A
W74-01418	5A	W74-01497	7C
W74-01419	5A	W74-01498	7B
W74-01420	5C	W74-01499	5C
W74-01421	5A	W74-01500 W74-01501	7B 7B
W74-01422 W74-01423	5C 5C	W74-01502	5C
W74-01424	5C	W74-01503	5C
W74-01425	5A	W74-01504	5B
W74-01426	5A	W74-01505	5A
W74-01427	5C	W74-01506 W74-01507	5A 7C
W74-01428 W74-01429	5C 5C	W74-01507	5C
W74-01429	5B	W74-01509	5A
W74-01431	5C	W74-01510	5C
W74-01432	5C	W74-01511	2K
W74-01433	5A	W74-01512	2K
W74-01434 W74-01435	5C 5C	W74-01513 W74-01514	5A 5A
W74-01436	5C	W74-01515	5B
W74-01437	5B	W74-01516	5B
W74-01438	5A	W74-01517	5B
W74-01439	5A	W74-01518	5C
W74-01440 W74-01441	5A 5A	W74-01519 W74-01520	7B 7C
W74-01442	5A	W74-01521	7B
W74-01443	5A	W74-01522	5A
W74-01444	5A	W74-01523	5C
W74-01445	7B	W74-01524	5C
W74-01446 W74-01447	5A	W74-01525 W74-01526	5C 5A
W74-01447	5G 2L	W74-01527	5C
W74-01449	5G	W74-01528	5B
W74-01450	5G	W74-01529	5A
W74-01451	5G	W74-01530	5C
W74-01452	4A	W74-01531	5B
W74-01453 W74-01454	2I 6E	W74-01532 W74-01533	5A 5D
W74-01455	6E	W74-01534	5A
W74-01456	6E	W74-01535	5C
W74-01457	6E	W74-01536	5B
W74-01458	6E	W74-01537	5B
W74-01459 W74-01460	6E 5G	W74-01538 W74-01539	5C 5B
W74-01461	5G	W74-01540	5B
W74-01462	6E	W74-01541	5B
W74-01463	3B	W74-01542	5C
W74-01464	6D	W74-01543	SC SP
W74-01465 W74-01466	6E 5F	W74-01544 W74-01545	5B 5A
W74-01467	6B	W74-01546	5A
W74-01468	6A	W74-01547	7B
W74-01469	5D	W74-01548	5C
W74-01470	5D	W74-01549	5A 5B
W74-01471 W74-01472	5B 6B	W74-01550 W74-01551	5A
W74-01473	SD	W74-01552	5B
W74-01474	5D	W74-01553	5F
W74-01475	4A	W74-01554	5A
W74-01476 W74-01477	2J 8A	W74-01555 W74-01556	5B 3F
W74-01478	5D	W74-01557	3F
W74-01479	3D	W74-01558	2H
W74-01480	6D	W74-01559	5D
W74-01481	6D	W74-01560	5C
W74-01482 W74-01483	4A 4A	W74-01561 W74-01562	2I 2H
W74-01484	5D	W74-01563	2F
W74-01485	5D	W74-01564	5C
W74-01486	5B	W74-01565	5B
W74-01487	2A	W74-01566	21
W74-01488 W74-01489	4B 4B	W74-01567 W74-01568	5C 2I
W74-01489	3D	W74-01569	21
W74-01491	3F	W74-01570	6B

W74-01571 W74-01572	5C
W74-01572 W74-01573	2G 5C
W74-01574	2G
W74-01575 W74-01576	3F
W74-01576	2G
W74-01577 W74-01578	5A 5F
W74-01579	5C
W74-01580 W74-01581	5F
W74-01581	5G 4A
W74-01581 W74-01582 W74-01583	
W74-01584	5D
W74-01583 W74-01584 W74-01585 W74-01586 W74-01587 W74-01588	2I 2I
W74-01587	5C
W74-01588	21
	21
W74-01590 W74-01591	2I 2I
W74-01591 W74-01592	21
W74-01593	21
W74-01594 W74-01595	2E 3F
W74-01596	3F
W74-01597	2D
W74-01598	5C 3F
W74-01599 W74-01600	2K
W74-01601	21
W74-01602	21
W74-01603	2H 2G
W74-01603 W74-01604 W74-01605	3F
	3F
W74-01607 W74-01608	2I 2H
W74-01609	2I
W74-01610	4A
W74-01611	4A
W74-01612 W74-01613	6E 5G
W74-01613 W74-01614	6E
W74-01615	5G
W74-01616 W74-01617	6E 6E
W74-01617	6E
W74-01618 W74-01619 W74-01620 W74-01621	6E
W74-01620	5G 4D
W74-01621	4B
W74-01622 W74-01623	7C
W74-01624 W74-01625 W74-01626	7B
W74-01625 W74-01626	6B 2C
W74-01627	4B
W74-01627 W74-01628 W74-01629 W74-01630	6B 6B
W74-01629 W74-01630	5C
W74-01631	5E
W74-01632	5C
W74-01633 W74-01634	3F 2D
W74-01635	21
W74-01636	2G
W74-01637 W74-01638	4A 4A
W74-01638 W74-01639	3C
W74-01640	8C
W74-01641 W74-01642	5C 2E
W74-01643	6B
W74-01643 W74-01644	6B
W74-01645	5B 5A
W74-01646 W74-01647	5D
W74-01648	2L
W74-01649	2L

W74-01650 2E

ABSTRACT SOURCES

Source .	Accession Number	Total
A. Centers of Competence		
Battelle Memorial Institute, Methods for Chemical and Biological Identification of Pollutants	W74-01297 01340 01342 01345 01347 01350 01353 01361 01363 01366 01397 01446 01492 01520 01522 01555 01645 01647	181
Cornell University, Policy Models for Water Resources Systems	W74-01486 01491	6
University of Arizona, Arid Land Water Resources	W74-01622 01623 01625 01627 01639	16
University of Florida, Eastern U. S. Water Law	W74-01447 01455 01457 01462 01610 01621	27
University of North Carolina, Metropolitan Water Resources Planning and Management	W74-01463 01470 01472 01485	22
U. S. Geological Survey, Hydrology	W74-01119 01171 01268 01286 01289 01296 01369 01370 01372 01383 01387 01396 01640 01642	107
B. State Water Resources Research Institutes		
Alabama Water Resources Research Institute	W74-01224 01225	2
Arizona Water Resources Research Center	W74-01104, 01231	2
California Water Resources Center	W74-01105	1
Colorado Environmental Resources Center	W74-01367	1
Delaware Water Resources Center	W74-01106	1
Georgia Environmental Resources Center	W74-01226, 01229	2

ABSTRACT SOURCES

Source		Accession Number	Total
В.	State Water Resources Research Institutes (Cont'd)		
	Illinois Water Resources Center	W74-01107	1
	Maryland Water Resources Research Center	W74-01108	1
,	Massachusetts Water Resources Research Center	W74-01643	1
	Minnesota Water Resources Research Center	W74-01109	1
	New Jersey Water Resources Research Institute	W74-01232	1
	New Mexico Water Resources Research Institute	W74-01110	1
	North Carolina Water Resources Research Institute	W74-01111 01112	2
	South Dakota Water Resources Institute	W74-0113 01115	3
	Virginia Water Resources Research Center	W74-01644	1
C.	Other		
	Agricultural Research Service	W74-01174	1
	BioSciences Information Service	W74-01172 01173 01202, 01209 01211, 01217 01219, 01221 01227 01228 01230 01233 01267 01287 01288 01341, 01346 01351 01352 01362, 01368 01371, 01384 01386 01456, 01471 01521, 01556 01609 01624, 01626	117
	Environmental Protection Agency	W74-01116 01118	3
	Ocean Engineering Information Service	W74-01175 01201 01203 01208 01210 01212 01216 01218, 01220 01222 01223	. 46
		01648 01650	
	Office of Water Resources Research	W74-01101 01103	3

CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

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- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

- NATURE OF WATER
- WATER CYCLE
- WATER SUPPLY AUGMENTATION 3 AND CONSERVATION
- WATER QUANTITY MANAGEMENT 4 AND CONTROL
- WATER QUALITY MANAGEMENT 5 AND PROTECTION
- WATER RESOURCES PLANNING
- RESOURCES DATA
- **ENGINEERING WORKS**
- MANPOWER, GRANTS, AND **FACILITIES**
- SCIENTIFIC AND TECHNICAL 10 INFORMATION

INDEXES

- SUBJECT INDEX
- **AUTHOR INDEX**
- ORGANIZATIONAL INDEX
- ACCESSION NUMBER INDEX
- **ABSTRACT SOURCES**



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